

***Indonesia's Deep Economic Crisis:  
The Role of The Banking Sector in Its  
Origins and Propagation***

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Iman Sugema

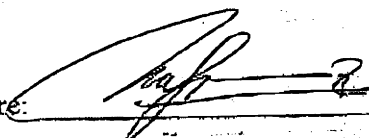
A thesis submitted for the degree of  
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October 2000

## ***Declaration***

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Unless otherwise indicated this  
thesis is my own work

Signature: 

Iman Sugema  
October 2000



## ***Dedication***

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To my country in despair  
Indonesia

# ***Acknowledgements***

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This study has benefited from the supervision by a number of people. First and foremost, I owe the greatest intellectual and personal debt to my thesis supervisor, Professor Hal Hill, who provided excellent guidance and support throughout the course of the thesis, and whose encouragement led to a greatly improved final draft. Professor Hill was always enthusiastic about my work, made himself available for consultation and was very prompt in giving comments. I am also grateful to Dr. Prema-Chandra Athukorala, my thesis co-supervisor (chair), whose advice on technical issues was extremely valuable. Dr. Athukorala has been an inspiration to me in the four years I have known him as a colleague and supervisor. I express my thanks to Dr. Ross McLeod, my thesis adviser, whose critics and comment on my earlier draft thesis were invaluable.

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# ***Abstract***

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This thesis aims to examine and the role of the banking sector in the origins and propagation of Indonesia's deep economic crisis. Specifically, the objectives are: (1) to assess banking sector weaknesses in the lead-up to the crisis, (2) to examine the consequences of a weak banking sector in making the economy vulnerable to a financial crisis, and (2) to highlight the propagation process of the crisis, with particular emphasis on the transmission mechanism provided by banking channels.

In order to achieve these objectives, microeconomic and macroeconomic approaches are employed. The former approach is used to determine the factors contributing to banking fragility. A model of banking fragility is established and its inferences tested in the empirical analysis using a Probit procedure. The latter approach elaborates possible macroeconomic interrelationships between the banking sector and the rest of the economy. A macroeconomic model is developed, and its inferences drawn in the empirical analysis using cointegrating regression, vector error correction model, and impulse response functions.

This study results in several key findings. First, at the onset of the crisis, the banking sector was indeed quite vulnerable. The underlying banking problems were: connected lending, inadequate equity capital, low liquidity, and high loan growth, foreign liabilities, and exposures to systemic risk.

Second, the balance of payments was susceptible to a capital inflows reversal. Three problems stand out: a high ratio of debt service to total exports, low ratio of foreign exchange reserves relative to liquid foreign liabilities, and currency mismatch.

Third, due to the weakness of the banking sector, interest rate policy was not effective in staving off the speculative attacks that occurred after the collapse of the Thai baht on 2 July 1997. Interest rate increases only complicated the difficulties for ailing banks, and raised the need to bail them out.

Fourth, both interest rate increases and large depreciation generated recessionary effects on real economic activities, especially investment. Thus, the adverse effects were mainly channelled through investment spending.

Fifth, while a real depreciation could have been expected to produce an expansionary effect, exports actually contracted, partly owing to a reduction in the supply of trade credit due to the collapse of the banking sector.

Sixth, the worsening economic situation increased banking fragility. Coupled with the socio-political crisis, this triggered bank runs, leading to a loss of monetary control, capital outflows, heightening inflation and a collapse of the domestic currency. In addition, the collapse of the loan market held back economic recovery.

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## ***Glossary and Abbreviations***

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BI	Bank Indonesia (the central bank)
BLBI	Liquidity support from the central bank
CBS	Currency Board System
FMOLS	Fully Modified Ordinary Least Squares
IBRA	Indonesian Bank Restructuring Agency
KLBI	Liquidity credit from the central bank
LOI	Letter of Intent
MNC	Multinational Corporation
MPI	Market Pressure Index
NPL	Non-Performing Loans
OMO	Open Market Operation
SBI	Central Bank Certificate (bond)
SBPU	Money Market Security
VAR	Vector Auto Regression
VEC	Vector Error Correction

### Notes:

1. Unless otherwise specified, all \$ refer to US\$
2. Devaluation and depreciation will be used interchangeably

# Chapter 1

## Introduction

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### 1.1. The Issue

A useful starting point to discuss the recent financial crisis is to look at the opening paragraph of the foreword by Calvo *et al* (1996) in the *Journal of International Economics*, 41, 1996, special edition, about the Mexican crisis 1994-1995. If the word Mexico is replaced by Indonesia and a few sentences are modified slightly, the paragraph will look like this:

The [Indonesian] crisis took most people by surprise. Prior to the crisis [Indonesia's] policies were highly praised by the IMF and the World Bank. The country [maintained 'the balanced budget' principle, a discipline that most developing countries only dreamed about]. Inflation [was under control, below the two-digit level], and many believed that growth [could be sustained at around 6 to 7 per cent]. Yet, the crisis struck in [August 1997] like a thunderbolt. International reserves – at a historic record 'high' in [June 1997 – exhibited no major drop when the currency finally collapsed]. In the aftermath, [Indonesia's] financial system was paralysed, and global investors rushed to dump their holdings of Indonesian securities in a global stampede. .... In the course of a few months, [Indonesia] went from being the apple in the eyes of IFIs to the family scoundrel, from the country that brokers heartily recommended to the basket case. Why?

Of course, pre-crisis Indonesia and Mexico were different, and the modified quotation is not meant to imply that the origins of the two crises were the same. But what is striking is that they ended up with similar crises.

To make things worse, consider the following facts indicating that Indonesia was the worst affected country in the Asian crisis episode. The economy crashed from 7.8 per cent annual growth in 1996 to minus 13 per cent by 1998. This is the largest growth swing in any given country since the great depression. Moreover, domestic banks' equity capital dropped from 41.3 trillion rupiah in June 1997 to minus 24.1 trillion in December 1998. By June

1999, 71 private banks had been closed by the authorities. The Jakarta Stock Exchange index reached its lowest level in December 1997, dropping by about 54 per cent from its highest level of 740 points in June 1997. The price of a few dozen stocks were even cheaper than a piece of candy. Total private capital outflows from December 1997 to March 2000 were estimated to be about \$34 billion, or equivalent to total private capital inflows for the preceding four years.

Clearly then, the question is how could the crisis happen? Admittedly, this is a difficult question. As Hill (1999a, p.4) puts it as: 'There is no single answer to the question 'what went wrong?' '. He further argues that to develop a sound argument for explaining the crisis, one has to cast the net widely, drawing on theory, empirics, country detail, and institutions, as well as recent history, economics, and politics.

However, at the risk of omitting several factors that are important to develop a 'convincing story', the focus of this study is somewhat narrower, i.e. the role of banking sector in the origin and propagation of the crisis. There are four reasons that make such a narrow focus interesting.

First, the 'twin crises' (i.e. balance of payment and banking crises) more frequently occurred in the 1980s and 1990s than in the 1970s (Kaminsky and Reinhart 1996 and 1999). Coincidentally, most of the crisis countries embarked on domestic financial market and capital account liberalisation in the 1980s. Therefore, many put the blame on this policy shift.<sup>1</sup> However, the problem is that this conclusion was achieved by examining panel data (multi-country analysis) and may therefore suffer over generalisation. This is not to oppose this view. However, there seems to be a need to conduct indepth country analyses to uncover the underlying problems. For instance, other studies point to problems of weak enforcement of prudential regulations, structure of the ownership of banks, and connected lending (see for example Diaz-Alejandro 1985, and Mishkin 1996 amongst others). In other words, the real issue may not be financial liberalisation per se, but deep-rooted institutional problems of the financial system.

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<sup>1</sup> Glick and Hutchison (1999) also come up with this conclusion.



Second, Kaminsky and Reinhart (1999) also argue that the impacts of the twin crises were far more costly than that of individual currency or banking crises. This suggests there is something special about the role of the banking sector in the origin and propagation of a currency crisis.<sup>2</sup> A weak-banking sector can make it difficult to defend a fixed exchange rate regime through an interest rate hike (Obstfeld 1994, and Obstfeld and Rogoff 1995). Once a currency collapse sets in, the weakening financial position of firms can lead to an increase in non-performing loans. The worsening of bank balance sheets may trigger bank runs, which can lead to the disfunctioning of financial intermediaries, the loss of monetary control, and capital flight (Mishkin 1996). This, in turn, transforms the twin crises into a full-blown economic crisis.

Third, earlier studies regarding the development of the pre-crisis Indonesian banking sector tended to suggest the state of the sector was 'favourable' for economic development (see for instance Chant and Pangestu 1994, and Kenward 1997). Few have highlighted the problems descriptively, e.g. violations of prudential regulations, rampant self-lending tactics in conglomerates owned banks, and high (but under-reported) exposure in the property sector. However, the fact that the banking sector was the worst affected seems to suggest serious problems were accumulating before the crisis, that somehow were not reflected in the official data. Note that the sector's value added shrank by about 37 per cent in 1998, or about three times more than the average contraction in other sectors. Moreover, the public cost of bank restructuring in Indonesia is estimated to be about 51 per cent of GDP, compared with 5, 13, and 25 per cent in Malaysia, South Korea, and Thailand, respectively (Lindgren *et al* 1999). This evidence points to the need for carrying out a more rigorous and comprehensive assessment of the state of the Indonesian banking sector leading up to the crisis.

Fourth, the role of the banking sector in the origin and propagation of the crisis remains a sparsely researched topic in the vast literature on the Asian crisis. Most knowledgeable academic observers have come to a general consensus that a weak financial system is one of the key issues. However, only

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<sup>2</sup> This issue will be addressed again in section 1.2.

a few studies have emphasised banking issues.<sup>3</sup> With regard to the Indonesian banking sector, the literature has generally been silent.<sup>4</sup> The current study is an attempt to fill this gap.

## **1.2. The Literature**

This section briefly outlines the literature on financial crisis, with specific reference to the role of the banking sector. More specifically, it highlights the development, both in theory and empirics, of three important issues, namely the origin of banking problems, the consequences of a weak banking sector, and the transmission mechanisms of financial shocks in the context of an open economy macroeconomic framework. The purpose here is to set the focus of this thesis.

### **1.2.1. Sources of banking problems**

Seven sources of banking problems will be briefly highlighted, namely liquidity mismatch, currency mismatch, boom/bust cycle, insurance problems, asymmetric information, weak enforcement of prudential regulations, and increased competition. There are also several other factors, which are important to consider. However, the purpose here is not to lists all possible factors, but to concentrates on a few important factors.

*Liquidity mismatch* is an inherent problem for banks, as they generally lend long but borrow short. Because of this, even a sound bank is prone to panic withdrawals of deposits (Diamond and Dybvig 1983). Panics are more likely to occur when economic conditions deteriorate, and as depositors become suspicious about impending banking problems (Postlewaite and Vives 1987, and Gorton 1988). In the context of an open economy, such panics can result in

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<sup>3</sup> Hahm and Miskin (2000) is an example.

<sup>4</sup> Pangestu and Habir (2000) attempt to address banking issues in the context of Indonesian financial crisis. However, they do not provide precise mechanisms regarding the interactions between banking sector and the rest of the economy.

capital flight and a balance of payments crisis (Goldfajn and Valdes 1997, and Chang and Velasco 1999).

*Currency mismatch* becomes a problem when a large unexpected devaluation or depreciation occurs. Banks are exposed to exchange rate risks when they borrow in foreign currency and lend in domestic currency. This usually occurs when a peg or quasi peg regime enjoys credibility for quite a long period, and when foreign interest rates are higher than domestic interest rates. Banks are exposed to exchange rate risk when they lend in foreign currency to the non-tradable sector. Thus, when devaluation occurs, non-performing loans increase. In either case, devaluation worsens banks' balance sheets.

*Boom/bust cycle* theory emphasises increased financial fragility during a boom period. Earlier work on this theory includes Fisher (1932 and 1933), Minsky (1977 and 1982) and Kindleberger (1978). The upturn in a business cycle may be accompanied by 'euphoria', which leads banks to make insufficient provision for risk. It can also lead to a high degree of speculative activity among investors in the assets market. The process is debt-financed, mainly by bank loans, which increases the indebtedness of firms, money supply, and price levels. Asset prices soar, and the bursting of this bubble characterises the down turn of the cycle. In turn, this triggers panic runs on bank deposits and sales of financial assets. Kindleberger stresses that this process may involve departure from economic rationality.

*Asymmetric information* problems occur because the individual borrower knows more about her own business than the banks do. There are two problems associated with this, namely adverse selection and moral hazard. Adverse selection occurs before the transaction, because it is difficult for banks to distinguish good from bad risk loan applicants. Moreover, because bad risk applicants are likely to be the most eager to obtain loans they are also the most likely to be chosen. Moral hazard occurs after the transaction, where banks have to suffer the hazards of 'immoral' conduct by borrowers. Borrowers take excessive risks, but bank cannot fully know this because of information asymmetries. This problem is more likely to occur when collateral is low or the

net-worth of the borrower deteriorates (Stiglitz and Weiss 1981, and Guttentag and Herring 1984).

*Incomplete debt contract* is a problem where banks cannot control all aspects of a borrower's behaviour. This problem arises because banks cannot fully specify all of the possible circumstances to which a borrower's behaviour is attached. The problem is made worse by the fact that bank loans are not fully transferable or tradable, as most of the borrowers do not have sufficient credibility to obtain funds by issuing bonds. A bank that is not satisfied with the borrower's conduct cannot sell the loan to other parties. This implies that it is difficult for the bank to avoid the risk of an incoming loss.

*Insurance problems* arise when banks are implicitly or explicitly guaranteed by the authorities. Because the guarantee is usually free or under priced (i.e. the tax payers bear the loss), it can create severe moral hazard. In the context of an open economy, the banks will be highly leveraged by foreign creditors (Dooley 1997, and Krugman 1998). When this insurance scheme breaks down, the twin crises occur.

*Weak enforcement of prudential regulations* will usually end in a severe financial crisis.<sup>5</sup> In an asymmetric information environment, it is difficult for depositors to discipline banks (i.e. by means of withdrawing deposits) because of the difficulty in screening 'good' from 'bad' banks. Therefore, public monitoring and controls on banks are delegated to the regulatory authorities. However, forbearances of prudential regulations are sometimes made possible due to the budgetary consequences of closing down large banks (i.e., the too big to fail phenomenon), possible systemic crisis, political interference, and a weak legal system. This can induce higher moral hazard problems, which accumulate, ready to be triggered to become a severe financial crisis.

*Heightened competition* can cause banking fragility, despite its positive impact on efficiency. Three possible impacts stand out, namely a decline in

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<sup>5</sup> See Caprio (1997) for a comprehensive discussion on prudential regulations.

profitability, lower provision for risk, and loan over-expansion (Davies 1995). In order to strengthen market position, banks may adopt predatory pricing (increasing deposit rates), leading to increases in deposits and loanable funds. This can lead to a lending boom, but because of the lower profitability and provision for risk, banks will be less able to cushion an adverse shock.

Indeed the literature provides a useful guide for identifying possible sources of banking problems. Most of the analyses require understanding the structure, conduct, and performance of the banking industry prior to the crisis. In other words, it is important to assess whether the industry was vulnerable before the crisis. This certainly requires analyses of bank balance sheets and the underlying institutional set up.

### **1.2.2. Consequences of a weak banking system**

Several factors that can lead to a 'distressed' banking system were outlined in the previous subsection. It is now time to discuss the consequences of a weak banking system in the context of the onset of a financial crisis. Three possible 'scenarios' are outlined as follows.

First, if the banking sector is particularly weak, it can trigger a balance of payments crisis (Velasco 1987). A bank bail out may have to be financed by printing money if non-inflationary means of finance are very limited. As in Krugman (1979), a prolonged monetary expansion will exhaust foreign exchange reserves, which can make a fixed exchange rate regime unsustainable.

Second, under a weak banking system, a self-fulfilling currency attack can occur (see Obstfeld 1994, and Sachs *et al* 1996, amongst others). In such a case, an exceptional interest rate rise can inflict additional damage to the system in the form of an economic recession and increases in non-performing loans. Because of this, interest rate policy would be neither credible nor effective in deterring the attack.

Third, a substantial part of bank loans may be financed by foreign borrowing, which can make both the balance of payments and the banks vulnerable to a sudden drying up of international liquidity (Goldfajn and Valdes 1997, and Chang and Velasco 1999). Withdrawal of foreign capital from the system causes loan contraction and capital outflow, triggering both a banking and balance of payments crisis.

In summary, the literature provides three possible crisis scenarios, which could be tested against each other in the context of a macroeconomic model. With this view in mind, an open-economy version of the Bernake-Blinder model (BBM) will be developed in Chapter 6.

### ***1.2.3. Transmission mechanisms and crisis propagation***

In the context of an open economy macroeconomic framework, various transmission mechanisms can be identified to analyse the effects of a change in the interest rate, exchange rate and other variables. This section will concentrate on the 'banking channel' of such transmissions.

The interest rate affects economic activity through the change in the cost structure of firms. In explaining the Great Depression, Bernanke (1983) suggests that given a heavy burden on borrowers, fragility can be manifested by raising the real cost of intermediation between lenders (banks) and some classes of borrowers. This means that the higher the leverage given to firms, the more pronounced will be the impacts of an interest rate rise.

The idea is that an increase in the 'premium of external finance' will make it necessary for firms to adjust inventory, investment spending and output level (Bernanke and Gertler 1995). The immediate impact would be in terms of the fall in inventory held by firms. In the longer term, if the high interest rate persists, it may be necessary to cut investment and output. Therefore, from the supply side, an interest rate rise can produce recessionary impacts.

An interest rate rise can also have demand side impacts, through a decline in domestic absorption. In the context of a balance of payments crisis, it may become necessary to reduce current account deficits by reducing domestic absorption. If a fixed exchange rate regime were to be maintained, an implosion in aggregate spending can be created through an interest rate hike (Sachs *et al* 1996a, and Tornell 1999).

A high interest rate is well known for its adverse impact on banks (Obstfeld and Rogoff 1995).<sup>6</sup> It increases liabilities, but bank incomes need not rise due to increases in non-performing loans. Moreover, stock prices may decline as a result of the worsening of firms' balance sheets (Mishkin 1996). In effect, the quality of bank assets also decreases.

The contractionary impact of devaluation may be best understood by employing a dependent-small-open economy framework.<sup>7</sup> In this framework, exports tend to be sluggish in the short run in responding to devaluation and, hence a balance of payments adjustment comes mainly from an import compression. The Marshall-Lerner condition dictates that the trade balance will improve if, and only if, the sum of elasticities of imports and exports with respect to real exchange rate is greater than one. If this condition is satisfied, devaluation can reduce current account deficits, leading to an improvement in the balance of payments.

The collapse in imports will be due to reduction in domestic absorption. In the short run, a nominal devaluation will lead to higher domestic prices for tradable goods, reducing real income.<sup>8</sup> Because of that, domestic consumption will decline. Moreover, it rises the burden of foreign debts, and, hence,

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<sup>6</sup> Obstfeld and Rogoff (1995) argue that in order to defend the fixed rate regime the Swedish authorities raised the overnight interest rate to 500 per cent in mid September 1992. This ultra high interest rate, though short lived, led to a much weaker financial position for banks. When the attacks rebounded in mid November, the authorities failed to increase the interest rate even up to 20 per cent. Finally, the Swedish krona collapsed, accompanied by a severe banking crisis.

<sup>7</sup> See Agenor and Montiel (1999) for extensive discussion of the contractionary impacts of devaluation in the context of an open-small-dependent economy framework.

<sup>8</sup> Income effects of devaluation are well known; see Diaz-Alejandro (1965)

depresses investment spending.<sup>9</sup> If the consumption-smoothing phenomenon applies, the effect on investment will be more pronounced.

In the long run, there will be offsetting effects. A real depreciation will stimulate exports. Therefore, the final impact on output will be ambiguous. If the contraction in domestic absorption outweighs export expansion, aggregate output will decline. It is known that devaluation will be contractionary, at least in the short run.

The adverse impacts of devaluation and an interest rate hike will be more pronounced if banking considerations are incorporated. Once the crisis sets in, the worsening of the economic situation and in firms' balance sheets can increase non-performing loans. This reduces the effective loanable funds to be allocated to healthier firms.<sup>10</sup> Because the 'allocative efficiency' of financial intermediation is reduced, firms become credit constrained, which further worsens the economic situation.<sup>11</sup>

The problems will be multiplied when the crisis involves panic runs on banks.<sup>12</sup> The worsening economic situation may lead depositors to doubt the reliability of the financial position of banks. Because of limited fiscal resources, bank runs may have to be financed by printing money. But, this will lead to an exodus of domestic financial resources and further exchange rate depreciation.

In sum, the banking sector needs to be incorporated explicitly in a macroeconomic model in order to better capture the transmission mechanisms of a financial. The BBM is useful analytical framework for this purpose.

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<sup>9</sup> See the seminal work of Krugman and Taylor (1978).

<sup>10</sup> Some emphasise moral hazard related loan contraction (credit rationing). See for instance, Mankiw (1986).

<sup>11</sup> The main function of banks is to mobilise funds to profitable activities (i.e. banks are better able to choose sound portfolios than individual-small-depositors). Thus accumulation of non-performing loans restrains this function.

<sup>12</sup> See Mishkin (1996) for a delicate exposition of this issue.



### **1.3. Objectives**

This research focuses on the role of the banking sector in making the economy vulnerable to a financial crisis and in propagating the crisis in the light of the Indonesian experience. The objectives are:

- To assess whether or not the banking industry was weak before the crisis by analysing the structure, conduct and performance of the industry.
- To examine the consequences of a weak banking system in making the economy vulnerable to a financial crisis by employing a bank-centred macro-econometric model.
- To shed light on the process of propagation of the crisis, with particular emphasis on transmission mechanisms provided by banking channels.

### **1.4. Outline of the thesis**

The thesis is organised as follows.

#### ***Part A: Introduction, Literature and Pre-crisis Indonesia, Chapters 1 to 3***

Chapter 2 reviews the existing financial crisis literature. Three approaches are outlined, namely the balance of payments, financial fragility and twin crises approaches. The purpose is to draw important lessons that may be relevant for explaining the Indonesian financial crisis.

Chapter 3 critically examines the development of pre-crisis Indonesia's macroeconomy and banking sector. The purpose is to set the scene for further analysis in the subsequent chapters. The chapter starts with a discussion of macroeconomic and banking policies from the 1970s to 1996, suggesting that during this period policies moved towards a more market friendly approach. The pre-crisis macro economic development seems to have been robust, as indicated by high economic growth, relatively 'low' inflation, a disciplined fiscal stance, and relatively comfortable current account deficits. However, a rapid

build up of short-term private debt and buoyant 'volatile' capital inflows may be viewed as seeding 'vulnerabilities' of the balance of payments to a capital inflow reversal. A descriptive analysis gauges the magnitude, direction, and pattern of the change in the structure of the banking sector. The trends indicate an increasing role for private banks. However, this was not accompanied by sounder banking practices, as indicated by frequent violations of prudential regulations and chronic borrowing from the central bank.

### *Part B: Microeconomic analyses, Chapters 4 and 5.*

Chapter 4 develops an analytical framework (model) to assess whether or not the banking sector is vulnerable to a crisis. The purpose is to provide a theoretical foundation for empirical analysis carried out in the subsequent chapter. The model implies that pre-crisis conduct and performance of a bank affects its ability to withstand adverse shocks during the crisis. It is a modified version of a model developed by Guttentag and Herring (1984).

Chapter 5 assesses whether or not the banking sector was prone to the financial crisis. Balance sheet data and Probit procedure are employed in the analysis. It is concluded that the banking sector was indeed fragile before the crisis. The estimates point to problems of low capital, high loan growth, crony banks, foreign exchange liabilities, connected lending, liquidity mismatch, and exposure to systemic risk.

### *Part C: Macroeconomic analyses, Chapter 6 to 10*

Chapter 6 develops a theoretical model from which macroeconomic interrelations and transmission mechanisms can be drawn. The model is a revision of the BBM, and modifications are imposed on (1) balance of payments equation, (2) demand for reserve money, and (3) monetary reaction function. It is shown that the model is able to capture the possible causes as well as the transmission mechanisms for analysing the propagation of the crisis.

Chapter 7 discusses econometric procedures and data employed in the macroeconomic analyses. For estimating the long-run equilibrium conditions,

the Phillips-Hansen procedure is adopted, due to its advantages in dealing with 'nuisance' parameters and its ability to tackle statistical problems associated with the use of small samples. For short-run dynamic analysis, impulse response functions derived directly from a vector error correction model are used. Sources, definitions and time series properties of the data are also discussed.

Chapter 8 deals mainly with the estimation of the long-run equilibrium condition implied by the model. Ten cointegrating vectors are estimated and suggest several implications for further analysis. For instance, it is suggested that the impact of an interest rate rise will be more pronounced than that of devaluation, although devaluation itself tends to be contractionary.

Chapter 9 discusses the vulnerabilities of the economy in the run up to the crisis. It is shown that foreign exchange reserves were insufficient to cover liquid foreign liabilities and, therefore, the balance of payments was vulnerable to a sudden reversal of capital inflows. Moreover, an interest rate rise could not be effectively used for deterring speculative attacks because it weakens the banking system.

Chapter 10 examines the propagation of the crisis. Several important findings are highlighted. Currency depreciation led to a contraction in domestic absorption and improvement in the trade balance. However, the improvement came mainly from an import implosion rather than from export expansion. Increases in the interest rate also reduced domestic absorption. Moreover, the impacts were more pronounced on investment rather than on consumption for both cases (i.e. interest rate increases and devaluation). It is also found that the increase in non-performing loans reduced output through the reduction of loanable funds. Furthermore, an increase in perceived risk about the health of the banking system induced bank runs, leading to an increase in reserve money holding (hoarding) and capital outflows. It is argued that the blanket guarantee provided by the authorities was not credible in preventing panic runs, because it was not accompanied by controls on capital outflows. In short, there is evidence regarding the role of the banking sector in propagating the crisis.

Chapter 11 concludes the analysis. It starts with a summary of the main findings. Implications are drawn, mainly to highlight several possible 'fixes' for the crisis. It is argued that fast and effective bank restructuring would be required for accelerating the recovery. Weaknesses in the current research and the need for further research are also discussed.

## **Chapter 2**

### ***Literature Review***

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#### **2.1. Introduction**

The 1990s was characterised by frequent and disastrous financial crises, notably the break down of the European Exchange Rate Mechanism (ERM) in 1992-1993, the Mexican crisis and subsequent 'Tequila effect' in 1994-1995, the ongoing Asian crisis, and finally the Russian and Brazilian misery. The major feature of the ERM crisis was the withdrawal of the British pound and Italian lira from the ERM, followed by currency and banking crises in Sweden, Norway and Finland. The debt, currency and subsequent banking crisis in Mexico spilled over to Argentina and Brazil. The world was rocked by the Asian crisis, which began somewhat innocuously with the collapse of the Thai baht, dragging down Indonesia, South Korea, Malaysia, and to some extent the Philippines. As the Asian crisis was entering the peak, the Russian rouble collapsed in August 1998. A few months later, Brazil joined the list of casualties when in January 1999 its 'real' peg was effectively broken.<sup>1</sup>

A by-product of these crises has been the burgeoning theoretical and empirical literature that attempts to search for possible causes and cures. And yet, there do not seem to be any definitive answers. A sceptical retrospect perhaps best expressed by Rodrik (1998, p.58) that:

(A) sad commentary on our understanding of what drives capital flows is that every crisis spawns a new generation of economic models. When a new crisis hits, the previous generation of models is judged to have been inadequate.

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<sup>1</sup> Brazil is particularly interesting since it has been involved in almost every major crisis, the 1980s Latin American debt crisis, the 1995 tequila effect, and the spill over from the Asian crisis.

At the risk of over generalising, differences among analysts may be traced through their basic approach, which can be divided into three strains, namely balance of payments, financial fragility, and the twin crises approach.

The balance of payments approach is, perhaps, the most popular and the existing models can be divided into three categories namely, first and second-generation models and capital account volatility models. The basic trait of the first generation model is that it explains the genesis of financial crises in terms of government policies that damage the credibility of a peg regime.<sup>2</sup> This model was first introduced by Krugman (1979) and gained popularity due to its merits in explaining the Latin American debacle of the early 1980s.

The second generation model offers the alternative view that attacks on a peg regime will succeed if the authorities perceive defending the peg to be more costly than allowing the currency to float, making the attacks self-fulfilling. Defending the peg can become very costly, both politically and economically, in an environment where unemployment is high and the banking sector is weak. This line of analysis, first proposed by Obstfeld (1994), is believed to be relevant for explaining the ERM crisis.

The capital account volatility approach puts the blame on increased financial integration and short-term volatile capital flows for creating a balance of payments crisis. It also stresses the role of self-fulfilling expectation and herding behaviour in the international capital market. The basic tenet of this view is that the surge in short-term capital inflows to an emerging market will be accompanied by increasing vulnerability in the balance of payments to a cessation of these inflows. This line of analysis is asserted by Calvo (1998a) and Calvo and Reinhart (1999), amongst others.

The financial fragility approach stresses the role of domestic financial system in making the economy vulnerable to an adverse macroeconomic shock.

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<sup>2</sup> See Dooley (1997) for precise definition of the first generation model.

The main argument is basically drawn from asymmetric information theory, in that the financial system breeds moral hazard and adverse selection problems, aggravating the effects of a seemingly harmless shock, and subsequently leading to a full blown economic crisis. This line of analysis was popularised by Mishkin (1996) in explaining financial crises in developing countries, especially the 1994-1995 Mexican debacle.<sup>3</sup>

The twin crises approach focuses on the links or causation between currency and banking crises. Interest in this approach grew after the publication of a paper by Kaminsky and Reinhart (1996).

This chapter provides a brief review of these alternative approaches. The purpose is to draw important lessons that may be relevant in explaining the Indonesian financial crisis.

The remainder of this chapter is organised as follows. Section 2.2 highlights the various approaches to a balance of payments crisis. Section 2.3 discusses the financial fragility approach, which is mostly adapted from Mishkin (1996). Section 2.4 sheds light on the relevance of the twin crises literature with an emphasis on the causal relationship between banking and currency crises.

## **2.2. Balance of payments approaches**

### **2.2.1. The first generation model**

The first generation model is possibly best defined as a framework that provides the mechanisms for a policy induced balance of payments crisis. In short, the government adopts a set of policies that are not consistent with a peg regime. Such policies include monetisation of fiscal deficits (Krugman 1979) and an implicit or explicit guarantee on private (banks and cronies) liabilities (Dooley 1997, and Krugman 1998). While there have been several modifications of the

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<sup>3</sup> The approach can be viewed as a revised version of the infamous debt deflation theory due to Fisher (1933).

model, the discussion will concentrate on the original Krugman model, and the Dooley-Krugman model.<sup>4</sup>

### ***Krugman's original model (KOM)***

The literature modeling foreign exchange attacks began with Krugman (1979), who developed the main ideas about the role of domestic credit expansion in collapsing a peg regime.<sup>5</sup> In the KOM, policy makers commit to maintaining two policies; (1) fixed exchange rate regime and (2) a high priority expansionary policy that is inconsistent with long-term maintenance of the fixed rate. The model shows that forward-looking speculators will hasten the break down of a fixed exchange rate regime which is inherently unsustainable, due to monetisation of an expansionary fiscal policy.

By assuming output to be constant within a monetary framework, constant monetisation of budget deficits will be directly associated with foreign exchange reserves losses. The twist is that, to maintain the fixed rate regime, the real money supply needs to be fixed as well. The base money has two components, foreign exchange reserves and domestic credit. Printing money to finance budget deficits expands domestic credit and subsequently creates excess supply of base money. Rational agents will not be willing to hold this excess, leading to conversion of the money to foreign exchange, thereby reducing reserves.<sup>6</sup> If this process occurs constantly, foreign exchange reserves will be exhausted, triggering a collapse of the fixed rate regime. Because domestic credit expansion can no longer be supported by running down reserves, the currency will be fully floated on the day reserves fall to zero.

The model yields two important predictions. First, foreign exchange reserves support two conflicting policy objectives, leading to two-objectives/one

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<sup>4</sup> The modified versions of the first generation model include Flood and Garber (1984), Obstfeld (1984, 1986), Cumby and van-Wijnbergen (1989), Goldberg (1990), and Flood *et al* (1996), amongst others.

<sup>5</sup> Krugman adopted speculative attack mechanism on gold reserves proposed by Salant and Henderson (1978) where the government tries to fix the gold price.

<sup>6</sup> Another way of understanding the loss of reserves is through the increase in current account deficits. Money expansion will create inflationary pressures, leading to real exchange rate appreciation and the demise of export competitiveness.



tool problem. Second, constant deterioration in the fundamentals may initiate and sustain dramatic attacks. Because the exchange rate will be floated on the day reserves fall to zero, subsequent deficits will be financed by inflation tax, implying a higher cost of holding domestic currency and a lower real interest rate on domestic financial assets (Dooley 1997). Knowing this, agents will initiate a run on foreign exchange reserves, leading to an inevitable collapse of the fixed rate regime.

However the model has two limitations. First, it is assumed that maintaining the fixed rate regime is an inferior objective relative to a high priority expansionary policy, thus ruling out the possibility of a shift in policies to be consistent with the regime. Devaluation may become politically costly – e.g. the possibility of losing office imposes a disincentive to devalue (Drazen and Masson 1994, among others). This problem is tackled by the second-generation model, in that the fixed rate regime will be defended, so long as it is less costly to do so, otherwise the currency will be floated.

Second, it is assumed that deterioration in fundamentals is fully reflected in the demise of foreign exchange reserves. However, the sequence of a fall in reserves followed by a collapse of the exchange rate is rarely observed (Dooley 1997). Moreover, Flood *et al* (1996) find that sterilisation of capital outflows by running down reserves occurs during attacks, implying the attacks were not triggered by deteriorating reserves. Before an attack, a boom in capital inflows may result in an accumulation of reserves. To stabilise the growth of base money, domestic credit creation needs to be reduced, which contradicts the sequence implied by the model. This leads Dooley (1997) and Krugman (1998) to revise the model by incorporating a crisis sequence where a boom in capital inflows precedes the crisis.<sup>7</sup>

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<sup>7</sup> Nonetheless, some empirical studies show that the collapse of a fixed rate regime can be well predicted by the depletion of foreign exchange reserves. See for, instance, Cumby and van-Wijnbergen (1989) for the Argentinean case of the early 1980s.

## ***Dooley-Krugman model (DKM)***

Due to dissatisfaction with the KOM, Dooley (1997) proposes a government-insurance-driven crisis, which still subscribes to the policy conflicts in the KOM, but with a different sequence and mechanism. Similarly, Krugman (1998) offers a moral-hazard-driven crisis, which surprisingly is almost identical to that of Dooley. Henceforth, this set of modeling will be referred to as the Dooley-Krugman model (DKM). Corsetti *et al* (1999a and 1999b) provide a formal exposition of the model.

The main differences between the DKM and KOM are twofold. First, in the KOM, government is the only source of policy conflicts, while in the DKM the private sector is also involved. Second, the collapse of an exchange rate regime is not the central issue in the DKM; it is only a byproduct of the insurance scheme. These differences will be made clear in the following discussion.

DKM maintains the policy conflicts in the background, where the government sets out two objectives: (1) the desire to give a guarantee on private liabilities and (2) the desire to accumulate reserve assets as a form of self-insurance.<sup>8</sup> By providing a guarantee the government is exposed to contingent liabilities, which can be large enough to generate a crisis or to stimulate an attack on reserves. In order for a guarantee to be credible the government needs to accumulate assets, which can be in the form of foreign exchange reserves.

A guarantee may be provided to banks, and to preferred parties or cronies. For the sake of brevity, the discussion will concentrate on cronies. As usual, a government guarantee is under-priced (or free), leading to moral hazard problems. Cronies will tend to accumulate debt-financed capital stock above the socially optimal level. As argued by Krugman (1998), this allows them to maximise profits in the case of successful investment, and transfer

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<sup>8</sup> Dooley (1997) uses insurance as the keyword, while Krugman (1998) uses guarantee. We will use insurance and guarantee interchangeably.

losses to the government in the case of failure. Moreover, projects with a high return but a low probability of success may be chosen. This moral hazard problem further burdens the government with potential losses.

Over accumulation of capital stocks is made possible when a guarantee is credible. In other words, if the government initially has sufficient financial resources to cover contingent liabilities, it eliminates any perceived risk attached by foreign creditors to the cronies.<sup>9</sup> Because of this, the cronies will become highly leveraged. In effect, the country will enjoy capital inflows and an investment boom. So long as a crisis does not erupt, the boom will be manifest in the form of higher economic growth. In this sense, a guarantee may be driven by the motive of spurring economic performance.

The eruption of a crisis is marked by a breakdown of the guarantee scheme.<sup>10</sup> A crisis evolves in the same manner as in the KOM, in that a deterioration in the fundamentals triggers the attacks. In the KOM, the constant depletion of foreign exchange reserves makes the collapse of a peg regime inevitable. In the DKM this need not be so. In the DKM, a deterioration in the fundamentals is captured by the growth of the contingent liabilities exceeding the growth of foreign exchange reserves. Hence, the KOM emphasises the absolute demise of the reserves, while the DKM stresses the relative demise of government assets compared to liabilities.

A constant demise in the fundamentals will eventually make the guarantee unsustainable, i.e. liabilities will exceed assets. In Dooley's terms this is referred to as the decline in the insured value, which constantly approaches zero. As in the KOM, attacks on foreign exchange reserves will occur on the day the insured value reaches zero, leading to the breakdown of the insurance scheme. In short, a crisis evolves as follows: a surge in capital inflows, an investment boom, increasing contingent liabilities, capital outflows and finally the break down of the insurance scheme. It should be stressed at

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<sup>9</sup> Dooley (1997) maintains that the government's own net-worth minus the contingent liabilities has to be positive in the initial period in order for the guarantee to be credible.

<sup>10</sup> Dooley and Krugman share identical view regarding the mechanism leading to the crisis, though in different way/exposition.

the outset that this requires the assumption that the government is credit constrained, i.e. has limited access to foreign borrowings and future tax.

There are three lessons to be drawn from this model. First, a seemingly robust economic performance, i.e. high economic growth and investment, does not necessarily imply economic stability. This does not mean that high growth is a bad thing. Rather, it is the way the growth is achieved and investments are financed that matters in making a country vulnerable to a financial crisis.

Second, steady increases in foreign exchange reserves associated with large private capital inflows do not necessarily reduce a country's vulnerability to a shift in private expectations (Dooley 1997). Measures comparing a government's net worth with its contingent liabilities are more appropriate. For instance, if a guarantee is given to or channelled through banks, a decline in the ratio of foreign exchange reserves to M1 or M2 will indicate a higher vulnerability.<sup>11</sup>

Third, a crisis may be accompanied by the collapse of a peg regime, but the collapse itself is only a symptom, not the underlying problem. The attack on the insurance scheme will result in capital outflows, which induce excess demand for foreign exchange. Because of that, the peg regime cannot be maintained.

In the context of the Asian crisis, Krugman (1998) and Corsetti *et al* (1999b) argue that the moral hazard problem is one of the key elements. Their argument is based on the observation that crony capitalism is an acute problem in Korea, Thailand and Indonesia. Close connections between conglomerates, banks, and government officials is an indication that conglomerates and banks are implicitly or explicitly guaranteed.

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<sup>11</sup> See Stoker (1994), Sachs *et al* (1996), and Calvo and Mendoza (1996) for application of ratio of foreign reserves to M2.

### **2.2.2. Second-generation models**

Both the first and second-generation models are fundamentals-based models, in that government decisions to hang on to or opt out of the exchange rate regime depends on the state of the fundamentals. Perhaps the only real difference between these two models is in the formulation of policy conflicts. The second-generation models have a more general set up, where policy makers face a decision dilemma: (1) defending a peg regime would impose costs in the form of loss of foreign exchange reserves adverse impacts of an interest rate hike, and (2) opting out of a peg regime would also be costly (loss of political credibility, adverse impacts of devaluation on the balance sheets of firms with currency mismatch, etc.). Thus where there are dangers associated with either alternatives, policy makers will opt for the least costly option. In short, in the second-generation models, there is always the option of choosing either alternative. However, note carefully that in the first-generation models alternative (1) is always inferior. In other words, first-generation models are a special case of the second-generation models where defending the peg regime is too costly.

The second-generation models commonly identify three states of fundamentals: sound, vulnerable (multiple equilibrium) and very weak. If the fundamentals are sound (e.g. a 'rock solid' banking sector and low unemployment levels) it will not be too costly to deter speculative attack by means of engineering a recession through an interest rate hike. Moreover, with strong fundamentals, the attacks are unlikely to be prolonged, as agents soon realise that the probability of success is small. As a result, the damage to the economy is likely to be very small, as interest rates can be lowered after the attack is defeated. Therefore, an interest rate hike is needed only to show that the authorities are determined to defend the peg.

In a case where the fundamentals are very weak, a peg regime will be abolished whether or not it is attacked. For instance, after a collapse of several major banks, or near bank financial institutions, the authorities may be forced to step in to avoid a loss of general public confidence in the financial industry.

If the collapse is followed by bank runs and subsequent capital flight, it may be difficult to control the money supply and hang on to the peg regime.

In the case of vulnerable states where the fundamentals are neither particularly sound nor very weak, attacks on the currency can be self-fulfilling in that defending the peg regime tends to worsen the state of fundamentals, increasing the probability of further successful attacks. Knowing this, agents will intensify the attacks, inducing further complications.<sup>12</sup>

It is often mentioned that second-generation models are those incorporating multiple equilibrium or a self-fulfilling mechanism. However, this is not quite correct. In fact, self-fulfilling attacks can be easily incorporated into the first generation model as in Obstfeld (1986).<sup>13</sup> Multiple equilibrium arises due to non-regularities in private sector behaviour in response to either an observed deterioration of fundamentals or perceived potential risks (not necessarily verifiable), making the timing of attacks, and the occurrence of a crisis, hardly predictable. This, in turn, emphasises the importance of panics, herding behaviour, and credibility.<sup>14</sup> However, several authors, such as Radelet and Sachs (1998a), have over emphasised the role of panic and shifts in public confidence and, thus, undermined the role of fundamentals in making attacks easy or difficult to handle. In fact, the second-generation models illustrate that, under strong fundamentals, panic are less likely to occur, while vulnerable and very weak fundamentals are likely to induce severe panic and government responses are unlikely to be credible.

In the context of the Asian crisis, especially for Korea, Indonesia, and Malaysia, many subscribe to the second-generation models. For instance, Tornell (2000) and Rajan and Sugema (1999a, 1999b) emphasise the weak

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<sup>12</sup> See Obstfeld and Roggoff (1995) for the Swedish case, where the authorities withstood the attacks in the first round by increasing the interest rate, but due to the weakened banking sector, could not afford to increase the interest rates again when the attacks were renewed.

<sup>13</sup> See also Cavallari and Corsetti (1998) and Flood and Marion (2000).

<sup>14</sup> Drazen and Masson (1994) make distinctions between credibility of policies and credibility of policy makers.

banking sector's role in an interest rate hike that lacked the credibility to stave off speculative attacks. Athukorala and Warr (1999), Corbett and Vines (1999), and Goldstein (1998) also point to the weak financial system as one of the sources of vulnerability.

### **2.2.3. Capital account approach**

The Asian crisis shifted attention from the current account to the capital account as the source of problems.<sup>15</sup> The IMF (1999) stresses that Asian countries suffer the 'new breed of economic crisis'. Calvo (1998a) and Edwards (1999) also argue that Asian crisis countries had either low (Indonesia) or high (Thailand and Malaysia) current account deficits, making it difficult to justify the argument that the deficits were the main cause.<sup>16</sup> By contrast, large swings in capital inflows characterised almost all crisis episodes (Golfajn and Valdes 1997, Calvo and Reinhart 1999).

The capital account approach focuses on the volatility of private capital flows and increasing global financial integration as the source of the problems.<sup>17</sup> Moreover, it stresses the difficulties in the adjustment process in the case of large capital inflow reversals which involve overshooting.<sup>18</sup> In essence, this approach shifts the blame from current account or solvency issues to capital account or liquidity issues (Caballero and Krisnamurthy 1998, Yoshitomi and Ohno 1999).

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<sup>15</sup> Edwards (1999) shows that current account ratios have limited usefulness in determining a country's financial health. See Calvo (1998a) for the irrelevance of current account and solvency issues. Obstfeld and Rogoff (1996) provide theoretical assessment as to why solvency models tend to suggest higher 'sustainable level' of current account deficits than actually observed amongst developing countries.

<sup>16</sup> Ades and Kaune (1997) suggest 4% and Milesi-Ferreti and Razin (1996) suggest 5% of GDP that can be considered to be a 'dangerous' level of CAD.

<sup>17</sup> See Lopez-Meiza (1999) among others for an extensive survey on the size and causes of increasing capital inflows to emerging markets.

<sup>18</sup> Calvo (1998a) develops a simple but powerful model to address the adverse effects of a sudden stop of capital inflows.

The main argument lies on the capital inflows/crisis sequence, where withdrawal of foreign investment, and the exodus of domestic financial resources, precipitates a liquidity crisis. The subsequent devaluation, deep economic recession, and insolvency problems hitting banks and firms are all parts of the painful adjustment process. There are four basic tenets that comprise this approach.

First, the surge in capital inflows and its determinants may be analysed for identifying likely associated problems. Calvo (1998b) and Radelet and Sachs (1998b), amongst others, emphasise that a surge in capital inflows precedes financial crises. Several factors are responsible for this surge in capital inflows, such as liberalisation of the capital account and domestic financial markets, a high domestic interest rate, a low interest rate in industrialised countries, government budget deficits, and the need to recycle current account surpluses in the new industrialised countries.<sup>19</sup> By identifying the causes of capital inflows, it becomes easier to identify the likely triggers of a financial crisis. For instance, if capital inflows are stimulated by interest rate differentials, an increase in international interest rates can reverse the inflows.

Second, the approach also highlights some adverse consequences of capital inflows, which can stimulate a balance of payments vulnerability. Calvo *et al* (1993 and 1994) suggest two problems: (1) real exchange rate appreciation and (2) 'misallocation' of financial resources. Real exchange rate appreciation has two effects; (a) it tends to worsen current account deficits and (b) the required depreciation becomes larger once a crisis hits. A bank-lending boom may be partly financed by capital inflows, and banks may then enter risky activities that reduce loan quality.

Third, the structure of capital inflows is also an important consideration. Short-term portfolio capital is commonly considered to be more volatile than

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<sup>19</sup> See Calvo *et al* (1993), Lopez-Meiza (1999), and Griffith-Jones *et al* (2001) for comprehensive discussion on the causes of capital inflows.



direct investment and official capital flows. As portfolios become more diversified internationally, the marginal benefit from scrutinising single country fundamentals declines (Calvo and Mendoza 1996). In effect, small information distortions (e.g. devaluation elsewhere and unverified rumours) may generate large-scale cross-border shifts in portfolio holdings. Moreover, liquidity mismatch may increase vulnerability. Chang and Velasco (1998) extend the Diamond-Dybvig model within the context of an open economy, and maintain that panics can trigger a liquidity driven financial crash. The reason is that, because banks borrow short and lend long, they are exposed to liquidity mismatch. In the context of international borrowing, any reluctance by foreign lenders to roll over debts can cause both banking and balance of payments crises. Ito (1999) and Goldstein (1998) argue that liquidity mismatch was one of the problems leading to the Asian crisis.

Fourth, the adjustment process to capital inflow reversal may be painful. Though currency depreciation will have some expansionary impact through an improvement in exports, this will not necessarily bypass the crisis, because firms with currency mismatch will carry increased debt burden.<sup>20</sup>

### ***2.3. Financial fragility approach***

The financial fragility approach may be defined as a school of thought that concentrates on the structure and institutional characters of the financial system for explaining the sources of the problems. The main arguments are based on two basic elements. First, the financial structure of firms and financial intermediaries (banks hereafter) does matter, in that it affects (real) economic performance. Unlike the real business cycle theory, financial shocks can change the course of real economic activities. This is in contrast to the notion asserted by Modigliani and Miller (1958) that finance is a 'veil'. Second,

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<sup>20</sup> Many of the Asian banks and firms carried currency mismatch problems in the run up to the crisis (see Goldstein 1998, Bank of Thailand 1998, among others)

unlike commodity transactions, debt contracts involve two problems: (a) asymmetric information (the individual borrower knows more about her own business than the lender) and (b) incomplete contracts (lenders cannot control all aspects of the borrower's behaviour).

### ***2.3.1. Sources of banking fragility***

#### ***Forbearance of prudential regulations***

As suggested by Mishkin (1996), in an asymmetric information environment it would be difficult for depositors to monitor and discipline banks. In such a case, the authorities must ensure banks comply with prudential regulations. In other words, monitoring and examination of banks is delegated to the authorities.

Caprio (1997) suggests that authorities must take immediate corrective actions against non-compliance with prudential regulations in order to prevent larger problems of moral hazard. Non-compliance must be punished and insolvent banks closed. Regulatory forbearance, that is allowing banks to keep operating as usual despite violation of regulations, can encourage other banks to assume that they will also not be subject to punishment for non-compliance. Keeping insolvent banks alive is even more dangerous, because the owners have nothing to lose in gambling with the banks.

However, there are three reasons why prudential regulations may not work. First, a government facing with tax revenue constraints may try to avoid a large bank from failing due to fear that closure may induce systemic banking failures. Thus, the owners will not expect to lose it, even though their bank is insolvent. Adverse selection problems faced by depositors are particularly acute in countries that historically have weak banking system and where banks' periodically published financial reports are not credible. Even closing down a relatively small bank can trigger a widespread bank run and massive capital flight. With the view that the payment system and credit market are dominated by banks, authorities will be very cautious in deciding to close even a single

bank. The disruption in the national payment system will be very costly as it affects all other economic activities.

Second, a principal-agent problem can arise when the agents that are authorised to supervise banks do not carry out the job as expected by their principal. Supervisors may allow minor violations of the regulations by banks in exchange for extraordinary income. Senior central bank officials may not punish problematic banks as bank failures may affect their career. Moreover, supervisors may be subject to pressure from politically well-connected bank owners.

Third, monitoring and examination of banks may not be supported by a sound legal system. In a weak and corrupt legal system, guilty parties may walk free without punishment. In such an environment, even looting is made possible.

### ***High interest rate***

There are various channels suggested in the credit literature regarding the transmission mechanism of an increase in interest rates. First, it increases the premium on external finance for firms (Bernanke and Gertler 1990). The adverse effect of an increase in interest rates on firms' balance sheets depends on their financial structure. The higher the leverage, the more severe the effect. Moreover, the interest rate on short-term loans is likely to be adjusted more quickly than on long-term loans. As external finance becomes more expensive, firms will reduce inventory and investment on fixed capital in the short run. In the longer run, it may affect output and economic growth.

Second, banks' income may be reduced by increases in non-performing loans and decreases in interest rate margins. Firms with a low return and high leverage may not be able to fully service bank loans. Moreover, because deposit contracts are usually shorter than loan contracts, deposit rates may be adjusted more quickly than loan rates. Monetary tightening increases competition in the deposits market as liquidity dries up. On the other hand,

banks may be cautious in increasing loan rates due to fear of non-performing loans. In the short run, banks' interest income may decline.

Third, it can increase the fragility of the financial system as it induces moral hazard and adverse selection. As shown by Stiglitz and Weiss (1981), an increase in the interest rate can deteriorate the mix of loan applicants, where potential applicants with good risk but low yield will be driven out of the loan market. Moreover, existing borrowers become more likely to take riskier projects as the value of liabilities increases.

Fourth, due to increases in moral hazard and adverse selection problems lenders may choose to ration credits (Stiglitz and Weiss 1981). An exceptionally high interest rate may lead to a financial collapse resulting from a severe reduction in loanable funds (Mankiw 1986). Because good risk borrowers become more difficult to find, lenders may choose not to grant loans at all.

### ***Increase in uncertainty***

Aside from project-specific risk, there can also be unpredictable circumstances of a disastrous nature, which result in returns for investment at much lower level than usual. Uncertainty may comprise problems that are less frequently recurring and beyond the capacity of individual agents to solve, such as social disorder, political turmoil, wars, and abrupt changes in monetary policy regime.

Uncertainty has two implications for the financial market. First, unlike project specific risks, uncertainty is non-diversifiable, in the sense that it cannot be eliminated by portfolio diversification. Second, uncertainty may not be correctly priced by the market in the form of risk premium, especially during a tranquil period. Valuation of uncertain events may be very subjective, because they cannot be inferred from history and, hence, subjective and objective probability may not converge. Moreover, competition may drive prudent banks from the market as those charging a risk premium for low probability hazards can lose business to those ready to disregard such risk (Guttentag and Herring 1984).

## ***Asset price deflation***

Financial assets have two roles in the balance sheet of banks. First, they are often part of the bank's portfolio and, therefore, a decline in asset price will directly reduce the book value of bank assets. Second, they are often part of collateral and, therefore, the decline will reduce the credit worthiness of borrowers. This can propagate moral hazard on the part of borrowers as their net worth decreases. Moreover, a lower collateral value means that granting loans is riskier for banks. In short, the decline in asset price and the subsequent squeeze of the book value of firms can increase financial market fragility (Greenwald and Stiglitz 1988, Calomiris and Hubbard 1990).

## ***Increased competition***

An increase in competition may increase the efficiency of banks. However, it may also result in increased fragility in the banking system through a decline in profitability, lower provision for risks, and loan expansion (Davies 1988, 1995). Increased competition is likely to occur following a banking deregulation which involves a reduction in regulatory barriers of entry.

Increased competition may affect banks' liabilities through the increase in deposit rates, reducing the spread between deposit and loan rates. Higher deposit rates will increase the quantity of deposits, which then have to be distributed to borrowers. However, competitive pressures and threats of moral hazard problems may prevent banks from increasing loan rates. This may sharply reduce profits and provision for bad loans, creating a reduced ability to cushion adverse shocks.

The threat from new entrants and lower profitability can weaken the incumbents. Unlike new entrants, incumbents have to carry the burden of non-performing loans from previous periods, but, with lower profits, are less able to make provision against future losses.

If banks compete to increase market share, the negative effects of competition will be more pronounced. Incumbents may become aggressive in attempts to strengthen their position and drive the new entrants out by means of predatory pricing. Increases in the volume of loans may be viewed as necessary to offset the reduction in profit margin. However, this also means that previous loan (quantity) rationing needs to be relaxed, which may entail increased risk (Davies 1995).

### ***2.3.2. Financial crisis and its propagation***

So far, we have surveyed the literature on sources of bank fragility. An increase in fragility means a financial crisis can more easily erupt and transmit to the rest of the economy. In this section, propagation process of financial crises is discussed.

Mishkin (1996) identifies several factors that can set the stage for a financial crisis in developing countries, namely a deterioration in banks' balance sheets, an increase in interest rates, a stock market crash, an increase in uncertainty, and an exchange rate collapse. These factors worsen adverse selection and moral hazard problems and, consequently, lenders would be less willing to grant loans. As a result, investment and aggregate economic activity will decline.

In effect, the downturn in economic activity can result in a further deterioration in the balance sheets of firms and banks. Some firms may become technically insolvent, and others may not be able to fully pay the interest and/or the principal. There are two options for banks to deal with firm insolvency.

Banks may be willing to restructure the debt in the hope that the performance of firms will improve after the economy recovers. This may involve extending grace periods, transforming short-term into long-term debts, a debt to equity swap, and granting concessionary interest rates and principal (haircut). However, because these firms are insolvent, moral hazard problems

may increase, and default risks heighten. Moreover, if the number of creditors is large, there may be a coordination problem. Some may prefer bankruptcy, while others may be willing to restructure the debt. Some may allow the haircut, others may prefer a debt to equity swap.

An alternative resolution is through a formal bankruptcy procedure. However, seizing the assets of these firms can be costly and time consuming (Davies 1995). There may be legal problems regarding the conditions under which a bankruptcy can be imposed by a creditor. There may also be problems in determining the seniority of a debt relative to others, i.e. which debt should be paid first and which assets correspond to each creditor. Even if banks are able to seize the assets of insolvent firms, a further decline in asset price will set in. Under a distressed economic situation, the sale of assets can lead to a process famously known as Fisher's (1933) debt deflation process.

Both alternatives incur costs to banks and their capital may not be enough to cover these losses. Moreover, banks may not be able to shift funds from troubled to well performing firms. Thus, sound firms are likely to be credit constrained, making the crisis more persistent.

If banks can quickly sort out the problems and recover bad debts, prolonged economic contraction and debt deflation may be avoided. However, another threat may set in. Within an asymmetric information environment, a deterioration in banks' balance sheets may lead depositors to cast doubts over bank solvency. This, in turn, may trigger widespread bank runs, including runs on sound banks. Gorton (1988) maintains that bank runs are more likely to be observed when economic fundamentals weaken.

Bank runs have two effects. First, because the central bank functions as a lender of last resort, it becomes more difficult to control the money supply. As the money supply increases, a further currency depreciation may be difficult to prevent. Second, it reduces financial intermediation and loanable funds. This becomes more pronounced in the case of capital flight. In summary, panic runs complicate the crisis further.

### **2.3.3. Application**

The financial fragility approach has a strong microeconomic foundation. However, its applications for assessing financial crises in developing countries are somewhat limited. Comprehensive studies using this approach include Mishkin (1996) for the Mexican case, Hahm and Mishkin (1999) for the Korean case, and Mishkin (1999) for the Asian case in general.

Perhaps the application of this approach is hampered by the fact that it requires a careful assessment of the balance sheets of firms and banks. It is usually difficult to obtain reliable and comparable balance sheet data from developing countries. Because of that, most of the empirics are largely descriptive.

On the other hand, macro or aggregate level data most often give inconclusive results. For instance, Hill (1999) maintains that it is difficult to reach a strong conclusion as to whether Indonesian banks were weak before the crisis if one has to rely on aggregate level data only. This suggests the need to carry out a combined macro and micro level study. Indeed, this thesis is in this direction.

## **2.4. Twin crises approach**

The twin crises approach focuses on the interaction and causalities between a banking and currency crisis. The term 'twin crises' itself was popularised by Kaminsky and Reinhart (1996), though some earlier works also emphasised the links between the two crises, such as Diaz-Alejandro (1985), Velasco (1987) and Miller (1996).

In identifying links and causalities, this approach uses both the balance of payments and financial fragility approaches as the basis for theoretical reasoning. Note that the balance of payments approach does not ignore the role of a 'fragile financial system' in making a country susceptible to a balance of payments crisis. Likewise, the financial fragility approach also acknowledges



the importance of balance of payments issues as one of the sources of problems. They just give a different emphasis on the issue in question. Thus, the main contribution of the twin crises approach is somewhat limited in sharpening the focus of analysis, i.e. it puts more weight on the potential links and causalities.

### ***2.4.1. Causality from banking crisis to balance of payments crisis***

The empirical findings of Kaminsky and Reinhart (1996 and 1999) are most striking. They suggest that during the 1970s there seemed to be no apparent causalities between a currency and banking crises. However, during the 1980s and 1990s a banking crisis most often preceded a currency crisis.<sup>21</sup> Moreover, the peak of the banking crisis most often materialised after a currency crash, suggesting a vicious cycle once the twin crises erupt.

Theoretical literature also points to the same causality. For instance, Velasco (1987) and Miller (1996) argue that a domestic banking crisis can lead to over expansion in base money, leading to the famous Krugman (1979) balance of payments crisis. Confronted with a banking crisis, the authorities may have to finance a bank bail out by printing money, leading to financial disintermediation or the so-called 'internal drain'. This, in turn, precipitates capital outflows or 'external drain', as further expansion of base money sets the stage for a heightened inflation rate.<sup>22</sup>

A banking crisis may not be fully realised by the public. However, once the currency comes under attack, an interest rate hike will not be credible or effective in staving off the attacks (Obstfeld 1994, 1996, Sachs et al 1996, and Tornell 1999). A sharp increase in the interest rate can further complicate an already defunct banking system, making the probability of successful attacks higher.

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<sup>21</sup> Glick and Hutchinson (1999) find the same phenomena.

<sup>22</sup> The terms internal and external drains are introduced by Miller (1996).

Once the twin crises set in, devaluation and an interest rate hike create additional havoc in the banking system. Mishkin (1996) and Goldstein (1998) argue that devaluation increases non-performing loans if either banks or firms suffer currency mismatch. The decline in economic activities attributed to an interest rate rise also adds to the problem. In short, a full-blown financial crisis occurs after the collapse of the exchange rate.

#### ***2.4.2. Causality from balance of payments crisis to banking crisis***

A chain of causation may run from a balance of payments crisis to a banking crisis. One may modify the first generation model *a la* Krugman (1979) to incorporate the effects on the banking system. Because the authorities continuously print money to cover budget deficits after the collapse of the fixed rate regime, anticipated inflation, currency depreciation and a decline in the real interest rate can induce bank runs and subsequent capital flight. Because banks lend long but borrow short, the runs may lead to a break down of the banking system.

Stoker (1994) emphasises that external factors, such as an increase in foreign interest rates, may precipitate capital outflows and loss in foreign exchange reserves. In order to maintain the fixed rate regime, the loss in the reserves cannot be fully sterilised, leading to a contraction in money supply and increase in domestic interest rates. This, in turn, precipitates bankruptcies, bank loan contraction, and an increase in non-performing loans. Finally, bank balance sheets will deteriorate.

#### ***2.4.3. Contemporaneous twin crises***

Another possibility is that banking and balance of payments crises erupt at about the same time, suggesting that they share the same common factors. For instance, Goldfajn and Valdes (1997) and Chang and Velasco (1999) emphasise the drying up of international credit as the trigger of the crises. Their models are basically an open economy extension of the famous Diamond and Dybvig

(1984) liquidity crisis model, and suggest a capital inflow/crisis sequence. The models may be described briefly as follows.

A substantial part of bank loans is financed by foreign borrowing. Thus a surge in capital inflows, rapid accumulation of foreign debts and a bank lending boom will characterise the pre-crisis period. A large swing in capital inflows may cause banking and balance of payments crises at the same time, if foreign exchange reserves are insufficient. The swing may be triggered by adverse external shocks (e.g. a rise in the international interest rate) or panics and herding behaviour on the part of international creditors. As in Diamond and Dybvig (1984), bank runs cause a liquidity shortage and therefore banks have to liquidate assets, i.e. a credit crunch occurs. At the same time, the proceeds from the run are manifested in the form of capital outflows, triggering a balance of payment crisis.

Kaminsky and Reinhart (1999) relate the contemporaneous twin crises to an exchange rate based stabilisation programme commonly observed in the Latin American region. This programme typically leads to a debt overhang/crisis sequence (Reinhart and Vegh 1996). A consumption boom may be financed by bank loans and foreign borrowings in the early stage of the programme. Because the inflation rate adjusts sluggishly to the international level, the real exchange rate has to appreciate, leading to a worsening in the current account. At some point, where the probability of exchange rate regime collapse is high enough, foreign lenders may opt to withdraw from domestic banks, triggering the twin crises.

## **2.5. Concluding remarks**

The literature has provided diverse accounts of the origin of financial crises. However, some 'general consensus' regarding the Asian crisis may be inferred from the literature, as follows. First, the crisis is more likely to be associated with the boom/bust cycle of capital inflows, rather than with current account and insolvency issues. However, the underlying causes of the surge in capital inflows remains in dispute. One may subscribe to the moral hazard or the

insurance hypothesis. Others may pinpoint more conventional causes, such as a high domestic interest rate versus a low foreign interest rate, and capital account and domestic financial market liberalisation.

Second, a 'weak' banking system is a key element in making economies vulnerable to a financial crisis. This suggests that the financial fragility approach is especially relevant to uncover the underlying problems. However, the application of such an approach as a powerful analytical tool is hampered by the fact that reliable data regarding the balance sheets of firms and banks are difficult to obtain and are hardly comparable across countries. As an alternative to micro-level data, most analyses rely on macro-level data as a proxy for measuring banking fragility. However, the use of such data tends to give multiple interpretations and, thus, is largely subjective in nature. For instance, loan growth above 20 per cent may be interpreted as a 'dangerous' level. However, a pro-growth analyst may interpret this as a favourable development.

## **Chapter 3**

### ***The Macroeconomy and Banking Sector: Pre crisis analysis***

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#### **3.1. Introduction**

This chapter assesses Indonesia's macroeconomy and banking sector before the crisis. The purpose is to set the scene for more quantitative and detailed analyses about the *twin crises* addressed in the rest of the thesis.

This chapter begins with a discussion of major economic policy shifts that contributed to vigorous economic performance during the last few decades. A discussion of macroeconomic development is given in section 3.3. Major shifts in banking sector policies are discussed in section 3.4. Section 3.5 discusses several positive impacts of the banking reform in terms of physical development of the banking sector, and the astonishing growth of deposits and loan mobilisation. Section 3.6 highlights several serious problems that remained unresolved after the reforms and these may reflect the failure of the authorities in disciplining the banks.

#### **3.2. Major policy stances**

The macroeconomic features of pre-crisis Indonesia were seemingly robust or at least not worrisome. Economic growth was strong, above 6 per cent, exports continued to grow, foreign reserves accumulated steadily, capital inflows were buoyant, the interest and inflation rates were brought down, current account deficits were at a manageable level, and the fiscal budget was balanced. This relatively comfortable position makes searching alternative causes of the crisis a major challenge.

The robustness of the economy was partly due to macroeconomic policy orthodoxy, and increasing openness of the economy to both trade and capital flows. Beginning in the early 1980's, the authorities embarked on a series of economic reforms, mainly aimed at reducing dependence on oil income, improving efficiency in resources allocation, enhancing the competitiveness of tradable sectors, and, more importantly, sustaining high growth. Six policy stances stand out, namely: an open capital account regime, a balanced budget principle, improved monetary policy, a flexible labour market, a more outward oriented trade regime, exchange rate stability, and financial reforms.

An *open capital account regime* had been adopted since 1970, together with the abolition of the multiple exchange rate system, and long before the liberalisation of the trade regime and domestic financial reforms. In this respect, Indonesia had, superficially at least, adopted its policy reforms in reverse order to that suggested in the sequencing literature (Hill 1996).<sup>1</sup>

However, it should be noted that the term 'open capital account', as often used in the Indonesian policy debate, is somewhat different from the common textbook definition. Capital outflows are absolutely unrestricted, in the sense that there is no requirement for reporting or obtaining a permit for taking funds out of the country, except for cash (notes and coins). However, until recently, some restrictions applied for capital inflows. For instance, foreign direct investments were not permitted to areas included in the negative lists, such as retail and wholesale, media, and inland transport services. Moreover, there were ceilings on foreign borrowings applied to domestic banks and state enterprises. Given these features, it may be called as an *asymmetric open capital account regime*.

A series major *trade* reforms were enacted in the mid 1980s aimed at improving competitiveness of the tradable sector.<sup>2</sup> This was initiated by substantial reductions in nominal tariffs in 1985. The tariff range was reduced from 0-225 to 0-60 per cent, and most tariff rates ranged from 5 to 25 per cent.

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<sup>1</sup> See Edwards (1984) and McKinnon (1991) for a general discussion of sequencing.

<sup>2</sup> See Fane and Condon (1996) for an extensive discussion of Indonesian trade liberalisation.

The classification of tariff level was also simplified from 25 to 11 (Pangestu 1996). Moreover, custom operations relating to imports and exports, which were heavily loaded with corruption and bureaucratic inflexibility, were handed over to a private Swiss surveying company, *Societe Generale de Surveillance* (SGS).

The *exchange rate regime* moved from a peg to a somewhat more flexible regime (quasi peg with almost constant depreciation). From August 1971 to October 1978, the rupiah was fixed against the US dollar at Rp 415 per USD. The rupiah was devalued by 50 per cent against the dollar, and gradually depreciated thereafter as the authorities moved toward a 'dirty float' regime. Two major devaluations occurred later, in March 1983 (38.5 per cent) and in September 1986 (45 per cent). Although the official view regarding the exchange rate policy was that of a managed float with reference to a basket of currencies, technically speaking, the currency was crawling-pegged to the dollar. When there were signs of balance of payments problems, speculative attacks, and a fall in oil revenue, the authorities reacted by devaluing the currency or tightening the money supply. However, from 1988 onward, the official view was that a steady depreciation was preferable to further large devaluations, in the sense that it would create less adverse shocks to the economy and, perhaps, less speculative attacks (Cole and Slade 1996). Then during the 1990s the currency was artificially depreciated by 4 to 5 per cent a year. Because the balance of payments experienced an uninterrupted surplus during that period, free float would have almost certainly resulted in an appreciation. The purpose of this gradual depreciation was to promote export oriented industry (Fane 1995).

The use of *fiscal policy* as a means of 'disciplining' the central government was one of the main features of macroeconomic orthodoxy of the New Order. Fiscal budgets were kept in 'balance', and long-term overseas development assistance (ODA) was the only means of financing budget deficits, in order to avoid crowding out private investment. In the early 1980s, more than 50 per cent of government revenue was generated from oil and gas revenue. This was reversed in the 1990s, when the contribution of oil and gas revenue declined to

below 30 per cent. The increase in non-oil revenues was mainly attributable to a series of tax reforms and rapid growth in the non-oil formal sectors.

In contrast to fiscal policy, prior to 1983 *monetary policy* was somewhat rudimentary and undisciplined. This was the result of financial repression, where strict controls on bank lending and interest rates constrained the ability of banks to effectively mobilise loanable funds from non-government sources. During the early 1980s, credit programmes sponsored by the central bank accounted for almost 40 per cent of total loans channelled by domestic commercial banks.

From 1983, monetary policy stance moved toward indirect controls on monetary aggregates, in place of credit ceilings and interest rate control. The indirect instruments consisted of open market operations (OMO), discount window facilities, and reserve requirements.

The central bank used OMO to achieve its intermediate objectives in terms of interest rates, exchange rate, and growth in monetary aggregates on a daily basis. By affecting excess reserves and overnight rates, interest rates on deposits and loans would also be affected, thereby influencing the level of deposits and loans toward the intended level. However, the effectiveness of this operation depended on the extent to which international creditors were willing to supply funds. More specifically, if capital were perfectly mobile, OMO would not be effective, as deviation from the equilibrium interest rates would induce capital outflows or inflows.

There are two instruments used by the central bank to affect liquidity in the system: SBI (Sertifikat Bank Indonesia) or certificate issued by the central bank, and SBPU (Surat Berharga Pasar Uang) or money market security issued or endorsed by commercial banks. Selling SBIs and reselling SBPUs reduces money supply, while re-buying SBIs and purchasing SBPUs increases liquidity.

Discount window facilities, consisting of discount windows I and II, were intended to help banks against liquidity mismatch. The first discount window, with a maturity of no more than 14 days, was designed to provide funds for



daily liquidity management and to avoid erratic fluctuation in inter-bank interest rates. Banks could adjust liquidity by borrowing and lending in the inter-bank money market, but sometimes interest rates are too high, inducing costly funding. The second discount window, with a maturity of no more than 150 days, was designed to encourage banks in granting longer-term loans. As the bulk of deposits consisted of saving and time deposits, with 3 months maturity or less, banks naturally faced a liquidity mismatch when granting investment loans.

The central bank could also affect the level of monetary aggregates by setting reserve requirement at its own discretion. But this instrument was infrequently used and hardly variable. In 1988, the required reserve was reduced from 15 per cent of current liabilities, or effectively 10 to 11 per cent of third party liabilities, to 2 per cent of third party liability. In February 1996, the required reserve was increased again to 3 per cent and cash at the central bank was excluded from the definition of reserves, so that the effective required reserve was actually 3.3 per cent (Bird 1996). The required reserve was then increased again to 5 per cent in April 1997.

### ***3.3. Macroeconomic development***

This section aims to show that the macroeconomy in the lead up to the crisis was generally robust. Thus, attempts to look for weaknesses or vulnerability indicators using the so-called macroeconomic fundamentals would result in disappointment. Exceptions, perhaps, were the rapid build up of foreign debt and the increasing share of short-term private capital inflows in financing current account deficits, which made the balance of payments susceptible to the reversal of capital inflows. Because of that, our analyses will emphasise the balance of payments.

Pre-crisis Indonesia constantly maintained economic growth above the average developing country level. The lowest growth performances were 2.3 percent in 1982 and 2.5 percent in 1985 (see Table 3.1.). The decline in oil price and slower economic growth in the early and mid 1980's led to

devaluations and major economic reforms, especially in trade and finance. In the 1990's, after the reforms, growth was sustained at well above 6 percent. Compared to other crisis countries, the economy was growing almost as rapidly as Thailand and Malaysia, and far more rapidly than the Philippines. In 1996, a year before the crisis, growth was faster than the other crisis countries, except for Malaysia (see Figure 3.1).

**Table 3.1.** *Major macroeconomic indicators, 1981-1996*

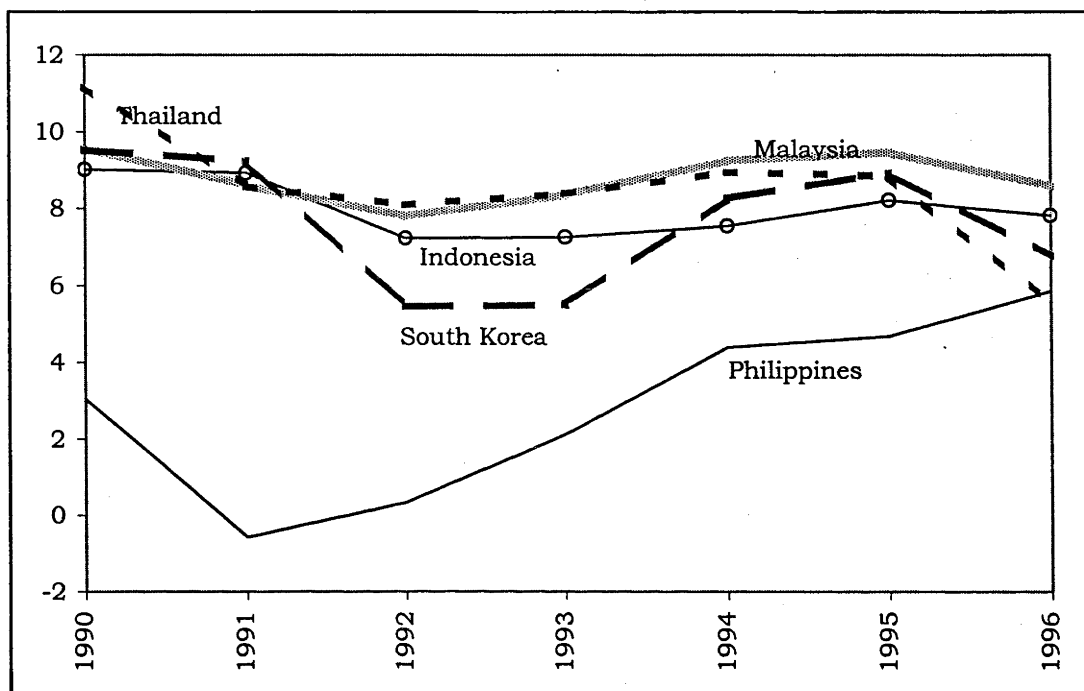
Year	GDP Growth	Inflation	RER (1990=100)	Gross Domestic Investment	Gross National Saving	Export	Current Account
	-----%			-----	% of GDP	-----	-----
1981	7.9	12.2	184.4	26.7	28.7	29.0	-0.6
1982	2.3	9.5	205.0	27.8	24.3	25.3	-5.6
1983	4.2	11.8	170.5	27.6	24.7	26.4	-7.4
1984	7.0	10.5	180.9	25.0	23.8	26.5	-2.1
1985	2.5	4.7	160.3	26.1	23.6	23.0	-2.2
1986	5.9	5.8	108.1	26.7	21.8	20.2	-4.9
1987	4.9	9.3	103.5	27.4	25.0	24.8	-2.8
1988	5.8	8.0	101.2	28.1	27.3	24.6	-1.6
1989	7.5	6.4	104.5	29.1	28.6	25.1	-1.1
1990	7.2	7.8	100.0	30.8	29.1	26.1	-2.6
1991	6.9	9.4	101.9	29.5	27.7	26.4	-3.3
1992	6.5	7.5	103.1	28.7	28.2	28.8	-2.0
1993	6.5	9.7	106.2	28.8	28.3	26.8	-1.3
1994	7.5	8.5	103.2	30.1	28.9	26.3	-1.6
1995	8.2	9.4	102.9	31.9	26.3	26.3	-3.2
1996	7.8	8.0	108.1	30.7	27.8	25.8	-3.4

*Sources:* Real exchange rate is taken from JP Morgan, while other variables are from IMF, International Financial Statistics database.

The share of investment to GDP tended to increase from the mid 1980s to 1990. Because the bulk of investment was mainly financed by domestic savings, there must be a direct relationship between development in banking and investment. In 1991 and 1992 there was a slight decrease in the ratio of investment to GDP despite the increase in foreign direct investment, partly because of slower growth in loans from banks (see the discussion on banking development, section 3.5). During this period, the money supply was tightened and banks had to meet the capital adequacy requirement. After the capital

adequacy requirement was relaxed in 1993, bank loans started to grow strongly contributing to investment growth.

**Figure 3.1.** *GDP growth of the crisis countries, percent, 1990-96*



Source: IMF, *International Financial Statistics* database.

Ever since the traumatic experience of hyperinflation in the mid 1960s, the Indonesian authorities had been obsessed with keeping the inflation rate under the two-digit level. Whenever inflation approached this level, the alarm bell rang, and preventive measures would be taken (Hill 1996). The authorities had been able to transform a country with chronic inflation into a relatively low inflation country, compared to most developing countries. Note, however, that Indonesia has never been able to match the record of the neighbouring low-inflation countries, notably Singapore, Thailand and Malaysia (McLeod 1997b).

Aversion to inflation sometimes led to overreaction by the authorities. For instance, due to the fear of economic over-heating and inflation that might be induced by high growth in lending, the authorities reduced reserve money and increased the interest rate almost without notice to the banking community

in February 1991. This shock resulted in a weaker banking system, as the increase in interest rates led to higher non-performing loans (Nasution 1994). In fact the most effective instrument for controlling bank lending was the imposition of the new capital adequacy requirement, and it was vindicated by the fact that growth in bank lending did not improve significantly in 1992 and 1993, after the reserve money was relaxed (see for example Cole and Slade 1996). Bank lending geared up only after the CAR was relaxed in May 1993, and therefore the liquidity shock might have been unnecessary.

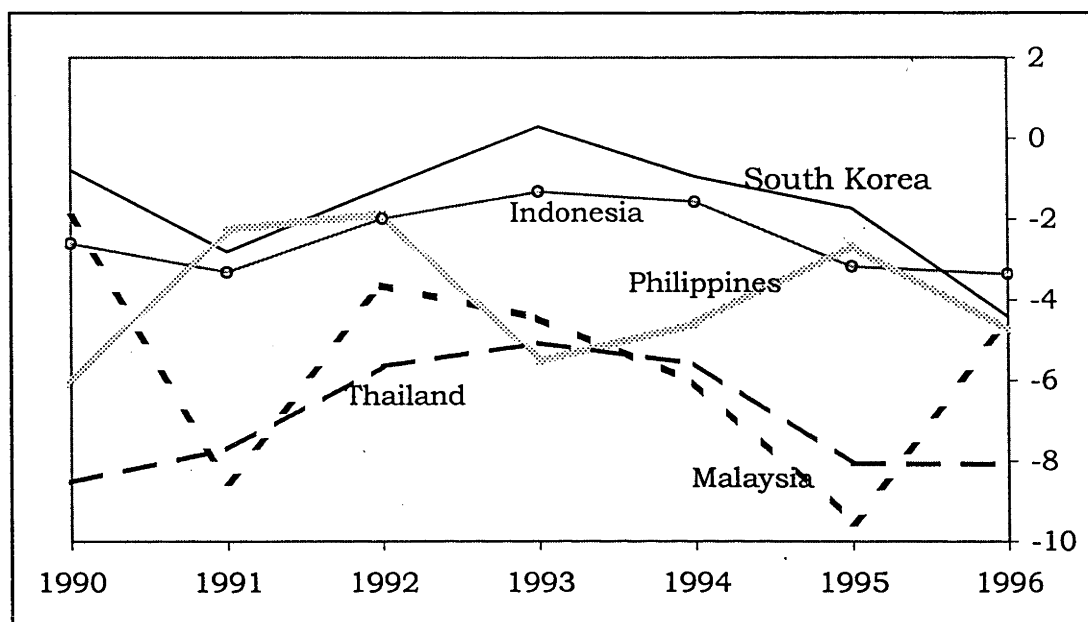
On the external front, the picture was mixed. Exports in goods and services continued to grow rapidly in the 1990s, owing to reforms in the mid to late 1980s. Moreover, the composition of exports changed, from a heavy domination by oil export, to exports from labour intensive industries (see for example Basri 2001, among others).

The annual current account deficits were at a manageable level in the years leading up to the crisis (see Figure 3.2). In this respect, Indonesia was in a better position than Thailand, Malaysia, and Philippines. Ostry (1997) concluded that the current account of these countries was at a 'sustainable' level, meaning that it was consistent with expected future income. However, Goldstein (1998), amongst others, maintained that it was at an alarming rate, especially in the case of Thailand. These two contrasting views reflect the difficulties in determining the extent to which current account deficits can be regarded as manageable or not.<sup>3</sup> That is, the conclusion regarding the sustainability of the current account largely depends on the analytical tools used. The former view emphasized the long-run capacity of the economy to finance the deficits, and therefore tended to underrate the potential short-run problems created by the deficits. However, the latter view could not provide an accurate benchmark for determining the size of the deficits that could pose a problem. Thus the debates remained speculative in nature. It is also obviously important to analyse the way the deficits were created and financed, and the use of the resources.

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<sup>3</sup> Edwards (1999) shows CADs are generally 'misleading' indicators of vulnerability.

**Figure 3.2.** *Current account balances of the crisis countries (% of GDP)*



Sources: IMF, *International Financial Statistics Database*.

In the 1970s and 1980s, current account deficits largely reflected the size of government budget deficits (Montes 2001). Budget deficits were mostly financed with foreign borrowing. Over the period 1982-1996, deficits in services and net transfers were the source of current account deficits, while trade balances were always positive. Thus, the deficits reflected payments on foreign services and interest on foreign debts, rather than trade deficits (see Table 3.2). Because the bulk of foreign debts were the government's, accumulated past budget deficits were also responsible for the persistent current account deficit during the later period.

In the 1990s, the way current account deficits were financed shifted from official to private sources, with private capital flows dominating total capital inflows. Because net official capital flows had been cut significantly, the increase in foreign direct investment (FDI) was not enough to cover the growing current account deficits. Besides, FDI was also partly responsible for the increase in capital goods imports, despite its positive impacts on exports.

**Table 3.2.** *Composition of Balance of Payment, 1982-1996 (\$ million)*

	1982	1983	1984	1985	1986
Trade Balances	1893	963	5707	5822	2458
Services and Transfer (net)	-7217	-7301	-7563	-7745	-6369
<i>Current Account</i>	-5324	-6338	-1856	-1923	-3911
Foreign Direct Investment	225	292	222	310	258
Official Capital Flows	3668	3860	2918	1747	2618
<i>Basic Balances</i>	-1431	-2186	1284	134	-1035
Private Portfolio	0	0	0	0	0
Other Private	1729	1902	317	-275	1301
Net Error and Omission	-2151	468	-620	650	-1268
<i>Overall balances</i>	-1853	184	981	509	-1002
	1987	1988	1989	1990	1991
Trade Balances	4674	5678	6664	5352	4801
Services and Transfer (net)	-6772	-7075	-7772	-8340	-9061
<i>Current Account</i>	-2098	-1397	-1108	-2988	-4260
Foreign Direct Investment	385	576	682	1093	1482
Official Capital Flows	2021	1908	2777	474	1299
<i>Basic Balances</i>	308	1087	2351	-1421	-1479
Private Portfolio	0	-98	0	0	0
Other Private	1075	-169	-541	2928	2916
Net Error and Omission	-753	-933	-1315	744	91
<i>Overall balances</i>	630	-113	495	2251	1528
	1992	1993	1994	1995	1996
Trade Balances	7022	8231	7901	6533	5948
Services and Transfer (net)	-9802	-10337	-10694	-12964	-13611
<i>Current Account</i>	-2780	-2106	-2793	-6431	-7663
Foreign Direct Investment	1777	2004	1500	3743	5594
Official Capital Flows	858	552	137	6	-663
<i>Basic Balances</i>	-145	450	-1156	-2682	-2732
Private Portfolio	0	1805	3877	4100	5005
Other Private	3494	1271	-1675	2410	911
Net Error and Omission	-1280	-2931	-262	-2255	1319
<i>Overall balances</i>	2069	595	784	1573	4503

Source: IMF, *International Financial Statistics Database*.

The persistent deficits in basic balances (the current account balances plus FDI and net official capital flows) led to a need for relying on short-term foreign capital inflows in the form of private portfolio and debt-generating capital inflows. In terms of portfolio capital, Indonesia was a latecomer, and only started to gear up after 1993. However, the increase was tremendous and became the main source of capital inflows, peaking in 1996 at a value of 5 billion dollars, compared with zero in 1992. This buoyant portfolio inflows were

attracted by development in the stock exchange, and improved perceptions regarding regional economic prospects (Nasution 2001).

The boom of private capital inflows enabled Indonesia to enjoy an uninterrupted balance of payments surplus from 1989 to 1996, and reduced pressure on the government to negotiate larger foreign borrowings to finance current account deficits. This led to some criticism that the Indonesian budget principle represented a purest form of the 'Lawson Doctrine', in that the government had the attitude the boom would never bust and therefore it failed to restrain further private capital inflows (see Montes 2001 for a detailed criticism).<sup>4</sup> Although the critics had a point, there were some restraints in place. In 1991, the central bank abandoned currency swap facilities inherited from the financial repression era. Ceilings on foreign borrowings of state owned enterprises, state and private banks, and private firms related to government projects were introduced in that year. In addition, new banking prudential regulations and ceilings on credit growth were also introduced from 1991 to 1996.

However, these measures seemed inadequate to slow down private capital inflows for at least six reasons. First, monetary tightening in 1991, and sterilisation of the balance of payments surplus throughout the 1990s, was responsible for maintaining a high interest rate differential in the order of about ten percent. Second, the authorities had practically no control on portfolio capital and, in fact, promoted investment in shares traded in the stock exchange. Third, non-bank private firms were not subject to ceilings on offshore borrowing, and did not report such borrowing to the authorities, making it difficult to monitor. Fourth, the stable exchange rate policy encouraged firms operating in non-tradable sector to borrow offshore. Fifth, there was a need to recycle the proceeds from the current account surplus that occurred in some of Asian newly industrialised economies (Nasution 2001). Sixth, sustained high economic growth together with the fast growing conglomerations and the close connection of most conglomerates to high-ranking officials may have improved the credibility of these conglomerates.

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<sup>4</sup> Named after UK Chancellor of the Exchequer Nigel Lawson.

These interrelated six factors set the stage for large private firms to seek funds from foreign sources.

The effectiveness of ceilings on the banks' foreign borrowing and on credit expansion to control capital inflows was undermined by the ability of large firms to obtain cheaper offshore funds, either directly through foreign banks or indirectly through the domestic stock exchange. Moreover, the ceilings may have restrained domestic banks from restructuring some of the non-performing loans inherited from the credit boom in 1988 and 1990, and from improving their financial position using cheaper foreign funds.

**Table 3.3.** *Composition of Foreign Debts, 1982-1996 (%)*

Year	1982	1983	1984	1985	1986
Total: US\$ million	25133	30229	32026	36715	42916
As % of GDP	26.5	35.4	36.6	42.1	53.7
Composition					
Short-term	14.4	16.8	18.2	16.6	15.2
Long term	85.6	83.2	81.8	83.4	84.8
Public and publicly guaranteed	72.9	71.1	69.5	72.9	76.0
Private non-guaranteed	12.7	12.1	12.3	10.4	8.8
Ratio of debt service to exports	18.1	18.8	21.8	28.8	37.3
Year	1987	1988	1989	1990	1991
Total: US\$ million	52495	54078	59402	69934	79548
As % of GDP	69.3	60.9	58.5	61.1	62.1
Composition					
Short-term	13.5	13.6	14.4	16.6	18.2
Long term	86.5	86.4	85.6	83.4	81.8
Public and Publicly guaranteed	77.8	76.2	74.5	68.7	65.2
Private non-guaranteed	8.7	10.3	11.0	14.7	16.6
Ratio of debt service to exports	37.0	40.3	38.4	33.4	34.3
Year	1992	1993	1994	1995	1996
Total: US\$ million	88002	89172	107824	124398	129033
As % of GDP	63.2	56.4	60.9	61.5	56.7
Composition					
Short-term	20.5	20.2	18.0	20.9	25.0
Long term	79.5	79.8	82.0	79.1	75.0
Public and Publicly guaranteed	61.0	64.1	59.3	52.5	46.6
Private non-guaranteed	18.5	15.7	22.7	26.6	28.4
Ratio of debt service to exports	32.6	33.6	30.7	30.9	36.8

Source: World Bank, World Debt Tables.



The offshore borrowing spree enjoyed by domestic private corporations changed the structure of foreign debts. The share of private foreign debts increased, from about 27 percent in 1988 to about 53 percent in 1996. The share of short-term debts increased from only about 14 percent to 25 percent in the same period (see Table 3.3).

Did this development lead to an increased vulnerability of the economy to a speculative attack? The answer to this question will be addressed in detail in Chapter 9. Needless to say, the debt to GDP and the debt service to export ratios might indicate that Indonesia was vulnerable to 'credit rationing' imposed by foreign creditors.

### ***3.4. Major changes in banking policy***

As in other sectors, Indonesia's policy stance on banking has moved from extreme interventionist approaches toward more market friendly approaches. During the years prior to 1983, the banking sector suffered from heavy intervention by the central bank and most of the characteristics of "financial repression" depicted by McKinnon (1973) and Shaw (1973) describes the situation very well (Hill 1996). Major banking reforms involved two stages. The first stage was in 1983, with the main aim to remove the controls on loans and interest rates. This was followed by more progressive reform in 1988 when the licence to establish new banks and branches was freed.

This section aims to briefly discuss major policy shifts in banking and the rationale behind them. The key policy changes are listed in Table 3.4. The impact of banking deregulations will be discussed in section 3.5. Problems in banking will be discussed in section 3.6.

#### ***3.4.1. Policy regime before 1983***

Prior to 1983, the banking system was characterised by the dominance of state banks, restricted competition and subsidised and controlled lending. State banks accounted for about 80 per cent of total assets of the banking

system. Interest rates and lending were centrally controlled, and a considerable proportion of loans directed to favoured sectors and parties. There was practically no issuance of licence to open new banks.

Controls on bank lending took various forms. Control on loan growth was introduced in 1974 as part of a range of counter inflation measures (Arndt 1974). However, controls were much more restrictive where the authorities could assign each single bank to lend to a particular sector by setting detailed loan ceilings for each bank (Chant and Pangestu 1994). By doing so, the central bank discouraged competition in the loan market and banks were forced to specialise in a particular segment. This was particularly so for state banks, where each state bank was restricted to operating in particular sectors. Private owned banks were mainly concentrated in retail banking, while subsidiaries of foreign banks were specialised on the financing of trade and investments carried out by foreigners (Binhadi 1995).

Such discretionary loan ceilings were responsible for retarding banking performance. During the seventies, central bank loans contributed 40 per cent of the loans from the banking system, or half of the loans issued by state banks. To quote Arndt (1979, p. 115) the system developed:

....at the price of almost complete subordination of commercial banks to discretionary central bank control which deprived the commercial banks of any incentive to compete with one another for business and limited their opportunities to exercise skills or initiative in the allocation of bank credit. It was a system inconsistent with the proclaimed objective of the authorities to develop a dynamic financial market for development.

A very high reserves requirement was the legacy of the Old Order, and was continued by the Suharto regime until 1977. Banks were required to hold reserves of at least 30 per cent of current liabilities. At the end of 1977, the required reserve ratio was cut to 15 per cent and the interest rate paid on excess reserve was reduced from 10 to 6 per cent per annum. This reduction in reserve requirement could have induced lending spree. However, because loans were controlled, banks were impaired in utilising their full capacity to mobilise

funds. As a result, the excess reserves increased from 5 to 9 per cent despite the cut in the interest rate paid on excess reserves (McLeod 1999).

**Table 3.4.** *Major banking policy reforms*

<i>Dates</i>	<i>Policy Changes</i>
1967	Re-opening of market to small number of foreign banks following era of bank nationalizations
April 1974	Payment of interest on banks' excess reserves
December 1977	Cut in required reserves ratio from 30% to 15% and cut in excess reserves interest rate from 10% p.a. to 6%
August 1982	Withdrawal of BI refinance for lower priority state bank loans
May 1983	Interest rate on state banks' six-month time deposit rate freed
June 1983	Removal of controls on lending by all banks All remaining time deposit interest rate controls on state banks removed Most loan programmes relying on heavily subsidized funds from BI discontinued (but significant relaxations soon thereafter, such that BI lending to banks continues to grow rapidly)
September 1984	Limit imposed on interbank borrowing: 7.5% of total funds
August 1985	Interbank borrowing limit increased to 15%
October 1988	New emphasis on prudential standards in relation to concentrated lending Opening of market to new private domestic banks and new foreign joint-venture banks Banks permitted to expand branch networks with minimum bureaucratic interference Easing of requirements for domestic banks to obtain foreign exchange licenses All branches of banks with foreign exchange licenses permitted to deal in foreign exchange (rather than only particular branches previously) Reduction of required reserves ratio from 15% to 2%

**Table 3.4.** (continued)

<i>Dates</i>	<i>Policy Changes</i>
October 1988	Imposition of 15% withholding tax on deposit interest Removal of limit on interbank borrowing State enterprises permitted to put deposits with non-state banks Banks permitted to introduce savings deposit products of their own design
March 1989	Removal of controls on banks' borrowing overseas Prudential standards widened to encompass limits on foreign exchange exposure (net open position)
January 1990	Most remaining subsidized loan programmes discontinued
February 1991	Prudential standards widened to encompass capital adequacy
1991	BI lending to banks begins to rebound after falling significantly
November 1991	Reimposition of controls on banks' borrowing overseas
February 1992	Foreigners permitted to purchase shares in domestic banks listed on the stock exchanges State banks permitted to list on the stock exchanges Distinctions between 'development', 'savings' and 'general' (commercial) banks removed New banking law gives government the option of treating all banks (not just state banks) as 'agents of development'
1995	Reimposition of de facto controls on bank lending
August 1995	Extension of central bank controls to bank involvement with commercial paper issues
December 1995	Extension of central bank supervisory authority to non-bank finance companies
February 1996	Increase in required reserves ratio, and exclusion of cash from definition of 'reserves'
June 1996	Tightening of licensing of new bank branches
February 1997	Imposition of fines on banks which expand more rapidly than permitted
April 1997	Further increase in required reserve ratio Tightening of prudential regulations

*Source:* Adapted from McLeod (1999)

The loan market was also characterised by a dual system, in which one segment was subsidised by the authorities and the other followed the market rate. Subsidised loans were directed to promote investment in favoured activities, such as small-scale business, agricultural factor supply and services, and government sponsored projects. However, such a subsidy might not necessarily improve investment as was intended, because the size of such a loan given to any borrowers had to be limited in order to reduce arbitrage opportunities (McLeod, 1980). Moreover, such a loan scheme promoted unfair competition in which bribery and corruption became a culture, and loan defaults became more likely to occur because loan applications were not assessed on the basis of soundness. In other words, the scheme promoted adverse selection problems.

Moral hazard and adverse selection problems became more pronounced, in the case of state banks, with the establishment of two credit insurance institutions (PT. *Asuransi Kredit* Indonesia and *Lembaga Jaminan Kredit Koperasi*) in 1973. One was to guarantee loans to small and medium enterprises, the other to guarantee loans to cooperatives. The problems were compounded by the policy requiring state banks to hand over bad loans to the Agency for Settlement of Debts to the State (BUPN). In other words, all bad loans, either produced by small or big enterprises or cooperatives, were to be resolved outside of the state banks. This meant that bank officials had little incentive to ensure the repayment of loans. This led the state banks to incur continuous and substantial losses at the expense of tax payers. Cole and Slade (1996, p. 89), amongst others, have observed that:

Despite the generous subsidies provided to the state banks by virtue of the large spread between the interest rate paid on funds borrowed from Bank Indonesia and the rate charged to borrowers, even on preferential loans, the state banks incurred continuing losses and had to receive additional grants of capital from the government to survive.

In summary, the banking system was dominated by poorly managed state banks functioning mainly as intermediaries of subsidised funds. Gradually, the burden of non-performing subsidised loans provided the impetus

for major banking reform in 1983. Moreover, private banks could not compete with the state banks, as new entry, both in terms of branching and the establishment of new banks was restricted, and expansion of loans was centrally imposed by the authorities, thereby limiting their capacity to expand market share. Despite the fact that they paid higher interest rates on deposit, private banks grew at almost the same pace as the state banks during the period 1974 to 1982. From 1974 to 1978, the assets of private and state banks grew by 10.0 and 9.2 per cent per annum. Similarly, the growth rate for 1978 to 1982 was 13.8 and 14.6 per cent per annum, respectively.

### ***3.4.2. Policy regime from 1983 to 1988***

In June 1983, the authorities made major policy changes, ending the era of financial repression. There were three significant policy shifts in banking, namely a cut in subsidised loans, the removal of interest rate controls, and the abolition of lending controls.

One of the motives for introducing these reforms was the immense burden of bad loans created from subsidised loan programmes. As McLeod (1999, p. 264-65) pointed out:

An important motivation was that experience with subsidised loan programmes had been disappointing. There is little evidence to show that they had much effect on the course of structural change on the economy. Moreover, it was clear that they had become a primary focus of undesirable rent-seeking activity. Many of what are now enormous private sector conglomerates were heavy borrowers from state banks, and were assisted to grow very rapidly by the large – but largely hidden – subsidy element in the loans they obtained. And countless borrowers large and small increased the size of their subsidies many times over by the simple expedient of failing to repay.

Moreover, the 1982 decline in oil income threatened the fiscal position of the central government. This triggered substantial pressures on the authorities to reform the financial sector as well as the trade regime in order to cut fiscal leakages and to find new sources of tax and economic growth. A reduction of

subsidised loans would help in reducing the fiscal burden. A number of such loans were discontinued and the proclaimed intention was to control growth of the remaining ones.

The curtailment of borrowing from the central bank to state banks meant that the banks had to compete in mobilising deposits. This required the removal of interest rate controls. Note that private banks had always been free to set their own interest rates. In May 1983, the time deposit rates in state banks with six-month maturity or more were freed. By June, all controls on deposit rates were completely removed.

As discussed earlier, stringent controls on bank loans had retarded competition amongst the efficient banks, and a rapid expansion in deposit mobilization would require a less restrictive loan allocation. Because of that, controls on lending were completely removed.

Despite these reforms, qualifications must still be made concerning the conduct of the state banks. First, over the ensuing five years state banks continued to rely heavily on subsidised loans from the central bank (Cole and Slade, 1996). After a brief pause in 1983, the practice of cheap funds was reinstated until 1988. The reason being that state banks continued to suffer moral hazard problems inherited from the previous "financial repression" era. Thus, further subsidies from the authorities were needed to cover the losses. However, as argued by McLeod (1999), this problem could have been resolved if the banks grew more slowly. In other words, improvement in the quality of loan portfolio should have been the main concern, by shifting loans from the previously un-profitable captive market.

Second, until recently command lending was still the norm, as state bank officers could not set themselves free from political influences, thereby preventing these banks from seeking more reliable borrowers. Before 1983, where loan subsidies were given to a wide range of borrowers, the targets of such programmes were publicly stated by the authorities. In the 1990s, conglomerates with close ties to the Suharto regime almost exclusively became the beneficiaries. In essence, there were no significant changes in loan quality.

Rather the changes were in terms of the borrowers. During the nineties, concentrated loans became fashionable (Nasution 1994).

#### **4.4.3. Policy regime: 1988 - present**

A more progressive banking reform package was introduced in October 1988, and is dubbed as PAKTO (Paket Oktober) or October Package. PAKTO consisted of eight main components:

- ❖ *Market entry.* In order to increase competition in and growth of the banking sector, and to have more efficient resources allocation, licences to open new banks and branches were reopened. Moreover, the existing foreign banks were permitted to open branches in six major cities instead of just Jakarta. Private banks were permitted to open branches or sub-branches based solely on business considerations with little guidance from the authorities. In addition, non-incumbent foreign banks were encouraged to form alliances with domestic banks, and these new joint venture banks were automatically given licence to deal with foreign exchange transactions.
- ❖ *Foreign exchange licence.* Requirements to obtain a foreign exchange licence for private banks were relaxed. Moreover, all branches of banks that have been given this licence are permitted to deal in foreign exchange transactions. Previously, the permit was limited to particular branches.
- ❖ *Tax on deposit.* A 15 per cent tax on deposit interest was introduced, the same as on capital gains from securities and on interest paid on bonds.
- ❖ *Reserve requirement.* The required reserves ratio was further reduced from 15 per cent of current liabilities to only 2 per cent of total third party liabilities. Note that, under the previous regulation, the required reserves ratio was applied to only two thirds of time deposits in state banks and to one third in private banks. Therefore the effective rate was



about 10-11 per cent of total third party liabilities (Cole and Slade, 1996).

- ❖ *Product differentiation.* Banks were allowed to design savings deposits of their own, which previously were restricted to two categories only: Tabanas and Taska, both are national saving programmes inherited from the seventies.
- ❖ State owned enterprises were permitted to put their excess funds up to 50 per cent in non-state owned banks and up to 20 per cent in any single bank.
- ❖ *Inter bank borrowing.* The limit on inter bank borrowing was completely removed. Previously, a 15 per cent limit out of total assets applied.
- ❖ *Legal lending limit.* Banks were permitted to give loans up to 20 per cent of capital to a single borrower, up to 50 per cent to a group of borrowers, and up to 5 percent to commissioners, shareholders and affiliates.

In addition, the authorities replaced the limit on bank borrowing overseas with the 'net open position' measure in March 1989. Under this new regulation, banks with a foreign exchange licence can bring in as much offshore funds as they want, providing they can loan most of those funds in the same currency.

Another important market-oriented reform was a further reduction of subsidised credit in January 1990. Bank Indonesia narrowed the scope of the subsidised credit program to four categories: rice production, marketing and buffer stock, and investment financing in less developed eastern Indonesia. Moreover, the interest rates on these programmes were brought closer to the market rates.

Surprisingly, these dramatic reforms were not preceded by the strengthening of prudential regulations and recapitalisation of the existing problematic banks. Note that most prudential regulations were developed only as responses to problems brought about by the reform. Because of that,

Nasution (1994) called this reverse sequencing. Prudential regulations and supervisions were rudimentary previously, as the central bank could easily watch and intervene state banks, which dominated the banking system, and therefore the pressure to develop an oversight capacity for disciplining banks was relatively small (Cole and Slade 1996). The only prudential regulation brought into urgency was the legal lending limit. This reflected the fact that loan concentration in state banks and conglomerate-owned banks was problematic.

A more cautious sequencing would have involved at least three initial actions; (1) strengthening prudential regulations and oversight capacity, (2) recapitalisation and strengthening of problematic incumbents, (3) keeping the banking sector closed to new entrants during the transition period (see Corbo and de Melo 1987, McKinnon 1991). Without this proper sequencing, the incumbents were the most vulnerable to the heightened competition as they had to carry non-performing loans inherited from the pre-reform period. Moreover, there is a danger of over expansion obstructing prudential measures amongst the incumbents. For instance, Cole and Slade (1996, p. 136) argued that:

As it turned out, however, the banks that proved most vulnerable to the new, more competitive and less protected environment were some of the older private banks and the state banks. A number of the established private banks set out to expand their market share in 1989-1990 almost without regard to cost. They opened new branches at a rapid rate, initiated new deposit schemes offering both high interest rates and attractive lottery schemes, sought foreign exchange licenses if they did not already have them and rapidly expanded overseas operations, and expanded their loan and investment portfolios at rates that precluded prudent evaluation. The new post-PAKTO banks, on the other hand, generally found it difficult to grow rapidly in the face of such competition. Given their limited deposit base, they had to depend more heavily on their own capital to fund assets, which may have encouraged a more cautious approach.

The explosive growth of loans and the potential associated problems subsequently led the authorities to put much more emphasis on prudential regulations of the banking system. In the process of formulating the PAKTO

reforms, serious consideration was given to the possibility of developing new prudential regulations and oversight capacity that would prevent incumbents and new entrants from irresponsible conduct. However, somewhat surprisingly, the authorities only addressed the legal lending limit, and on-site evaluation and supervision of banks did not address asset quality at all. For instance Cole and Slade (1996, p. 92) stressed that:

Bank Indonesia in late 1988 initiated a major effort to prepare new prudential regulations and improve its supervisory capabilities, ..... The system was intended to identify weaknesses in policies, procedures, practices and internal controls of individual banking institutions. .... The early warning information system and even the follow-on examinations did not address the issue of assets quality, which experienced examiners generally consider as the most important ingredient of a sound banking system and effective prudential supervision.

The long overdue prudential regulations finally came up on February 1991, known as PAKFEB (Paket Februari) or February Package. The main features of this regulatory package included:

- ❖ The imposition of capital adequacy requirement in line with the BIS standard. All domestic banks had to comply with the required 8 per cent capital adequacy ratio (CAR) within 33 months or by December 1993.
- ❖ The application of a new rating system for measuring bank soundness and as part of a new early warning information system.
- ❖ Prohibiting banks from owning equity securities or giving loans to individuals or security companies for the purpose of security trading and holdings.
- ❖ Putting further limits on the net open position of foreign exchange transactions.

The most important ingredient of this regulation was the capital adequacy requirement. For most newly established post-PAKTO banks, it was easy to comply with the new CAR, partly due to the fact that they had not been

able to attract deposits, and therefore a large portion of their asset portfolio was financed by their own capital. However, for large private banks, which previously had experienced explosive growth, it was difficult to comply with this new regulation due to two reasons. First, as a result of excessive loan expansion, they had accumulated a higher proportion of non-performing loans compared to their competitors, the newly established banks. This meant that risk weighted assets and the provision for classified assets was much higher. Therefore the capital required to meet the standard was also much higher. Second, their ability to raise capital was further hampered by a severe liquidity squeeze known as the second 'Sumarlin shock'.<sup>5</sup> High interest rates further depressed interest margins and profits and burdened the provision for bad loans (Cole and Slade 1996).

The tight schedule to meet the CAR requirement reduced loan growth to about 16 and 9 per cent in 1991 and 1992, from about 54 per cent in 1990. Banks tried to clean up their loan portfolio, as non-performing loans and especially bad loans induced an additional burden on the required capital. For banks lacking capital, it was necessary to cut back loans. This was particularly so in the case of private banks, where loan growth dropped to only 2 per cent in 1992 from 88 per cent in 1990.

Realising that it was difficult for most banks to comply with a 7 per cent CAR by March 1993 and 8 per cent by December 1993, the authorities eased the CAR marginally. The risk weighting on un-used credit lines and on loans to state owned enterprises was reduced from 100 to 50 per cent.

The enactment of banking law in 1992 further strengthened prudential constraints on the banking system. The major elements of this law were:

- ❖ Definition and scope of bank operation. A bank is defined as a deposit taking and loan granting financial institution and other loan creating institutions are prohibited from taking deposits. Moreover, the artificial and ineffective division of bank status, i.e. savings, development and commercial banks, was abolished and uniformed to commercial banks

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<sup>5</sup> Named after the Minister of Finance, at the time.

only. Somewhat disturbingly, all banks were now required to act as an *agent of development* in addition to acting as ordinary profit maximising entities. Previously, the agent of development function was solely carried by state banks.

- ❖ Legal lending limit. According to this law, a bank is subject to legal lending limits and the central bank shall stipulate regulations concerning such limits.
- ❖ Ownership. Private banks can issue shares in the stock exchange, and foreigners can buy up to 49 per cent of the shares. However, state banks can only issue shares up to 49 per cent of total capital.
- ❖ Banking supervision. The law clearly defines the role of Bank Indonesia and the Department of Finance for the supervision of banks and dealing with troubled banks.

Following the banking law, the new legal lending limits were set in May 1993. The limit is now simplified: loans to an individual or a group of borrowers should not exceed 20 per cent of bank capital. For existing loans, banks were given an adjustment period up to March 1997 to comply with the new limits.

## **3.5. Banking sector development**

### **3.5.1. Expansion of the banking industry**

After the freeing up of bank licences in October 1988, the banking sector recorded astonishing growth in terms of the number of banks and branches, and private banks contributed most to the growth. Table 3.5 presents the development in the number of banks and branches from 1981 to 1997.

Before 1998, there was a decline in the number of private banks, while the number of state, regional development, joint venture, and foreign banks remained constant. The number of private banks dropped from 74 in 1981 to

66 in 1988. Merger and acquisition was the main the policy adopted by the authorities to resolve problematic banks, thereby tending to reduce the number of banks.

Between 1988 and 1994, some 129 new banks were established; 100 of these were private banks. This massive development increased competition, especially in deposit taking. Banks offered high interest rates and a lottery scheme to attract deposits. As competition began to put pressure on the weaker banks, after 1994 the number of banks started to decline. The number of private banks dropped from 166 in December 1994 to 160 in June 1997 due to the merger of several banks.

The increase in the number of bank branches was even more explosive. From 1981 to 1988, the number of banks increased from 1,361 to 1,940, or only 82 new branches established every year. By contrast, since 1988 almost 500 new branches have been established every year and by June 1997 there were 6,337 bank branches, with 4,267 belonging to private banks.

### ***3.5.2. Change in market structure***

The deregulation in 1983 and 1988 altered the course of the banking sector towards a greater role for private banks from the previous state banks dominated financial system. The growth in mobilisation of funds, which experienced a declining trend during the financial repression, era gained momentum after the deregulation. Table 3.6 and 3.7 present the development in bank deposits, and loans.

Mobilization of deposits expanded rapidly, especially in 1983, 1989, and 1990, where the growth rate was about 41.8%, 44.3%, and 51%, respectively. Growth slackened in 1991 and 1992 due to tight monetary policy and the imposition of tighter prudential regulations, especially the capital adequacy requirement. When the CAR was relaxed in May 1993, deposit-taking activities regained momentum.

**Table 3.5. Number of Bank and Branches, 1981-1997.**

Year	Number of Commercial Banks					Number of Bank Offices				
	Private Foreign & Joint Venture					State Banks	Private National Banks			
	State Banks	National Banks	Joint Venture	Regional Development	Total		State Banks	National Banks	Joint Venture	Regional Development
1981	7	74	11	26	118	838	311	32	180	1361
1982	7	73	11	27	118	854	326	35	196	1411
1983	7	72	11	27	117	874	353	36	203	1466
1984	7	71	11	27	116	898	386	37	213	1534
1985	7	71	11	27	116	909	429	37	222	1597
1986	7	67	11	27	112	952	466	37	229	1684
1987	7	67	11	27	112	992	538	37	235	1802
1988	7	66	11	27	111	1004	631	35	270	1940
1989	7	90	21	27	145	1009	1493	41	341	2884
1990	7	109	28	27	171	1018	2145	48	352	3563
1991	7	129	29	27	192	1044	2742	53	408	4247
1992	7	144	30	27	208	1066	2855	56	425	4402
1993	7	161	39	27	234	1076	3036	75	426	4613
1994	7	166	40	27	240	1171	3203	83	431	4888
1995	7	165	41	27	240	1301	3458	83	446	5288
1996	7	164	41	27	239	1379	3964	86	490	5919
Jun-97	7	160	43	27	222	1463	4267	89	518	6337

Source: BI, Indonesian Financial Statistics.

**Table 3.6. Development of Deposits Mobilisation by Group of Banks, 1981-1997.**

Period	Total Deposit (Rp mil)	Growth (%)						Share (%)			
		Total	State Banks			Private National Banks			Foreign & Joint Venture		Regional Development
			Banks	Banks	Banks	Banks	Banks	Banks	Banks	Banks	
1981	8,044							76.0	10.7	9.0	4.4
1982	8,670	7.8	0.9	37.7	25.8			71.1	13.7	10.5	4.7
1983	12,297	41.8	35.8	78.5	44.1			68.1	17.2	10.6	4.0
1984	15,363	24.9	19.7	42.4	24.3			65.2	19.6	10.6	4.6
1985	20,032	30.4	28.8	50.6	8.5			64.4	22.7	8.8	4.1
1986	23,276	16.2	17.6	18.6	9.0			65.2	23.1	8.3	3.4
1987	29,096	25.0	19.2	48.3	7.5			62.2	27.4	7.1	3.3
1988	37,458	28.7	24.4	39.5	21.7			60.1	29.7	6.7	3.5
1989	54,034	44.3	31.6	74.9	30.2			54.8	36.0	6.1	3.1
1990	81,587	51.0	36.9	69.9	65.7			49.7	40.5	6.6	3.1
1991	95,118	16.6	3.1	30.4	27.9			44.0	45.4	7.3	3.4
1992	111,429	17.1	25.8	10.5	7.7			47.2	42.8	6.7	3.3
1993	142,454	27.8	17.3	41.2	16.3			43.3	47.2	6.1	3.4
1994	170,406	19.6	4.2	32.1	26.9			37.7	52.2	6.5	3.6
1995	214,764	26.0	18.1	32.1	23.3			35.4	54.7	6.3	3.6
1996	281,718	31.2	19.1	40.5	30.9			32.1	58.6	6.3	3.0
Jun1997	303,039	15.1	3.0	21.9	24.5			30.3	60.4	6.6	2.7

Source: BI, Indonesian Financial Statistics.



**Table 3.7. Development of Bank Assets by Group of Bank, 1981-1997**

Period	Total Assets (Rp mil)	Growth (%)					Share (%)			
		Total	State Banks	Private Foreign & Joint Venture Development			State Banks	Private National Banks	Foreign Joint Venture Development	Regional Development
				Banks	Banks	Banks				
1981	12,490						79.78	9.44	6.92	3.86
1982	15,269	22.25	22.00	28.73	21.32	13.29	79.61	9.94	6.86	3.58
1983	19,936	30.57	26.28	47.01	64.22	15.73	77.00	11.20	8.63	3.17
1984	26,458	32.71	28.92	64.85	20.18	45.47	74.80	13.91	7.82	3.48
1985	33,658	27.21	24.89	39.58	27.38	27.34	73.43	15.26	7.83	3.48
1986	40,802	21.23	18.97	40.09	7.40	17.27	72.06	17.63	6.93	3.37
1987	48,202	18.14	16.87	30.30	6.27	6.01	71.29	19.45	6.24	3.02
1988	63,284	31.29	23.09	61.72	6.93	79.29	66.84	23.96	5.08	4.13
1989	93,024	46.99	29.77	95.43	60.22	28.53	59.00	31.85	5.54	3.61
1990	132,623	42.57	28.77	62.90	90.32	15.42	53.29	36.39	7.39	2.92
1991	153,239	15.54	9.62	20.47	32.45	19.50	50.56	37.94	8.47	3.02
1992	180,148	17.56	20.53	14.18	16.10	14.31	51.84	36.85	8.37	2.94
1993	213,959	18.77	7.15	32.14	30.41	22.97	46.77	41.00	9.19	3.04
1994	248,061	15.94	3.74	28.80	18.94	21.12	41.85	45.55	9.43	3.18
1995	308,618	24.41	17.59	29.92	28.47	23.34	39.55	47.57	9.73	3.15
1996	387,477	25.55	15.44	36.44	18.43	10.04	36.37	51.69	9.18	2.76
Jun1997	427,031	10.21	5.03	13.58	11.57	10.70	34.66	53.28	9.30	2.77

Source: BI, Indonesian Financial Statistics.

**Table 3.8. Development of Bank Loans by Group, 1981-1997**

Period	Total Loans (Rp mln)	Growth (%)						Share (%)			
		Total	State Banks	Private National & Foreign Joint Venture Development			State Banks	Private National & Foreign Joint Venture Development			
				Banks	National Banks	Regional Development		Banks	National Banks	Regional Development	
1981	11,434						85.8	7.3	4.8	2.2	
1982	11,542	0.9	-4.9	43.5	21.5	44.5	80.8	10.4	5.8	3.1	
1983	15,042	30.3	27.5	57.5	29.3	15.1	79.0	12.5	5.7	2.7	
1984	20,898	38.9	37.1	61.4	21.5	24.1	78.0	14.6	5.0	2.4	
1985	24,944	19.4	17.3	34.9	2.6	25.5	76.7	16.5	4.3	2.6	
1986	30,258	21.3	19.1	34.1	12.2	19.7	75.3	18.2	4.0	2.5	
1987	41,736	37.9	24.3	91.4	44.8	49.7	67.8	25.2	4.2	2.7	
1988	50,442	20.9	27.1	7.7	9.8	4.3	71.3	22.5	3.8	2.4	
1989	62,910	24.7	10.0	63.8	62.8	35.9	62.9	29.6	5.0	2.6	
1990	96,978	54.2	35.2	88.1	98.3	41.7	55.2	36.1	6.4	2.4	
1991	112,825	16.3	11.8	19.6	37.8	13.6	53.1	37.1	7.5	2.3	
1992	122,918	8.9	14.0	1.2	9.6	15.3	55.5	34.4	7.6	2.5	
1993	150,271	22.3	4.8	42.8	57.9	17.9	47.6	40.2	9.8	2.4	
1994	188,880	25.7	11.8	42.8	24.7	18.2	42.4	45.7	9.7	2.2	
1995	234,611	24.2	16.8	29.4	32.0	24.8	39.8	47.6	10.3	2.2	
1996	292,921	24.9	16.5	34.3	13.8	23.2	37.2	51.2	9.4	2.2	
Jun1997	328,808	24.5	14.9	32.0	17.7	41.4	35.6	52.9	9.1	2.4	

Source: BI, Indonesian Financial Statistics.

Private banks were most aggressive in deposit accumulation. In 1982, the share of private banks in deposit mobilisation was only 10.7 per cent compared to 76 per cent of the state banks. By June 1997, the situation reversed, with private banks holding 60.4 per cent of total deposits, while the share of the state banks dropped to 30.3 per cent. The share of regional, joint venture and foreign banks tended to decline as well, but not as dramatically as that of the state banks.

The success of private banks in attracting deposits was attributable to a number of factors, such as competitive interest rates, rapid expansion in branch networks, and better customer services. Most of the private banks tended to offer higher deposit rates complemented with attractive lottery schemes and advertising. Moreover, they were able to develop better products and services for savings and time deposits.

The greater ability of banks in mobilising deposits was consequently accompanied with a rapid expansion in loan creation. Loan expansion was particularly 'excessive' during 1989 and 1990, during which the banking sector recorded its highest loan growth. In 1989, private banks recorded an almost unimaginable loan growth of about 95 per cent.

The high loan growth in these two years led the authorities to be concerned about the possibility of economic overheating, and its adverse impact on inflation (Nasution 1995, among others). As discussed earlier, the authorities took harsh measures by squeezing the reserve money supply followed by enactment of stricter prudential regulations. Though the money supply was soon relaxed, loan growth slackened until 1994. It was difficult for banks to adjust to the capital adequacy requirement because of the burden of non-performing loans created by the tight money policy.

In order to reverse the situation, the authorities relaxed the capital adequacy requirement by changing the risk weights on several categories of bank assets in May 1993. As a result, the loans growth of private, joint venture and foreign banks began to improve. However, state banks seemed to take a more conservative direction up to the onset of the crisis, as indicated by their

relatively lower loan growth. One of the reasons for this was that they were less able to attract deposits, as indicated by their much slower deposit growth during that period.

As with deposits following the reforms, the private banks played a greater role in granting loans. In 1982 the private banks' share in loans was only about 9.4 per cent, but by June 1997 their share increased dramatically to 53.3 per cent. On the other hand, the share of the state banks decreased sharply from 79.6 per cent to 34.7 per cent during that period.

It could perhaps be presumed that the greater role of private banks should result in more efficient resource allocation than that which bureaucrats in the state banks were able to achieve. However, despite the astonishing growth in lending, it has to be recognised that the loan quality may not necessarily increase for two reasons. First, most of the large private banks are owned by the same conglomerates that used to borrow from the state banks. Now they had their own banks to borrow from. Experience in Latin American countries such as Chile suggests this self-dealing practice, together with weak enforcement of prudential regulations, can result in poor loan quality, increasing the fragility of the banking system (Diaz-Alejandro 1985). Second, there is a sizeable literature that suggests loan quality weakens as a result of a relatively high loan growth (see for example Sachs *et. al.* 1996). Banks may have to enter new markets they are not familiar with. Moreover, loan growth may not be accompanied by an increase in the managerial skills of the bankers.

### **3.5.3. Financial deepening and asset holding**

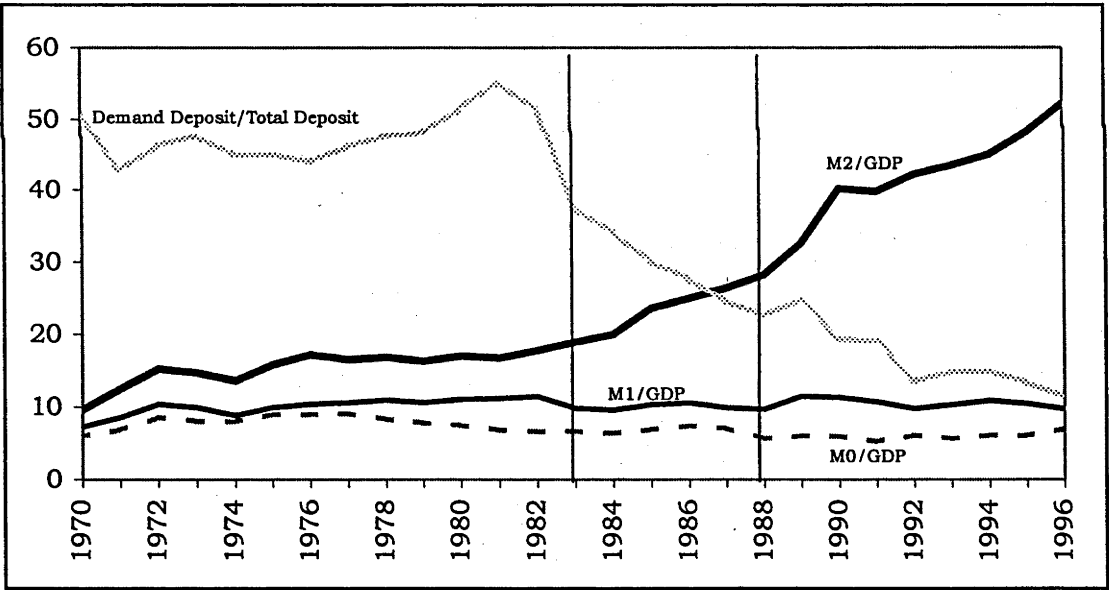
Banking reforms also changed the composition of financial asset holdings in favour of interest yielding assets. Figure 3.3 depicts the development in financial deepening as measured in the ratios of M0, M1, M2 to nominal GDP.

The ratio of reserve money to nominal GDP tended to decrease slightly from around 7-8 per cent in the 1970's and early 1980's to around 6 per cent in the 1990's. The ratio of M1 to nominal GDP tended to stabilize at around 10

per cent after 1983. This suggests there was a stable relationship between these two monetary aggregates with the nominal GDP. This perhaps explains the fact that M0 and M1 are held for transaction purposes and therefore the demand for these two assets is highly correlated with total nominal output. Thus, it is not surprising that the financial reforms had little impact on these two assets.

The increase in the ratio of M2 to nominal GDP accelerated following the 1983 reforms, and was further accelerated by the 1988 reforms. The ratio was only about 19 per cent in 1983, and had increased to 52 per cent by 1996. This suggests that the increase in real interest rates and access to banks had significant effects on the holdings of interest yielding assets. In other words, the reforms increased the availability of loanable funds in the banking system, which is consistent with the McKinnon-Shaw hypothesis.

**Figure 3.3.** *Indicators of financial deepening (%)*



Sources: Indonesian Financial Statistics, BI.

The composition of deposits also changed in favour of time and savings deposits, which offered higher interest rates than demand deposits. In 1982,

demand deposits accounted for 51 per cent of total deposits. After the deregulations, this share dropped sharply and by 1996 was only 11 per cent.

### ***3.6. Recent banking problems***

Despite this promising development, there were some potential negative impacts of the banking liberalisation. Industrial organization theory suggests that the removal of barriers to entry may lower the franchise value of banks (see for instance, Davies 1995). This, together with information asymmetry and increased competition, can heighten moral hazard problems, and thus increase the fragility of the banking system (see Mishkin 1996 for a detailed discussion on this issue).

This section shed lights on the banking problems and their origin, mainly based on the observations of existing literature and magazines. Unfortunately, it is hard to find a quantitative study to investigate this problem. Most of the studies regarding the Indonesian financial sector focussed almost exclusively on the positive impacts of the deregulation (see for example, Kenward 1997). To fill this gap, a quantitative analysis is provided in Chapter 5, while this section highlights the problems qualitatively.

#### ***3.6.1. Ownership concentration***

Following the reform in 1988, the cost of, and regulatory barriers to, establishing a new bank declined significantly. Consequently, by 1994, there were at least 27 conglomerates that owned two or more banks. For instance, the Salim group and the Lippo group each owned 7 banks, the Gajah Tunggal and Panin groups each had 5 banks, and the Kalimanis, Dwima, Harapan, Sinar Mas and Danamon groups each had 4 banks. Any corporate strategist would suggest that owning one large bank is generally more efficient than two or more small banks. And yet, up to the onset of the crisis, mergers tended to occur when the authorities persuaded them to rescue weak banks, but not on the basis that mergers can improve efficiency.

Interestingly, the authorities did not seem to realize the problems associated with domination by a corporation or group in bank ownership. These same conglomerates also built interlocking ownership in non-bank financial institutions and non-financial corporations, making it harder to control self-lending. Perhaps the attitude of the authorities was that these groups could allocate loans better than the officials of state banks. However, as will be discussed later, these conglomerates tended to borrow from their own banks, disregarding the legal lending limits. Moreover, in several cases, banks were abused for gambling. In other words, with the now greater role of private banks, the problems were not actually solved but potentially shifted from state banks to private banks. Nasution (1995, p. 185), now the Acting Governor of Bank Indonesia, put these problems as:

Through networks of ownership, ....., nearly all of the domestic private banks were closely connected to large conglomerates ..... . During the country's period of financial repression, the non-bank companies owned by the conglomerated grew rapidly because of the availability of subsidized credits from state-owned banks. .... Problems arise if less efficient subsidiaries are carried by sales to other companies in the group. Moreover, large firms may lose the flexibility necessary to continue to respond adequately to new challenges and changing business environments. The collapse of the large conglomerates - PT Astra, PT Bentoel, and PT Mantrust - in 1990-1991, indicated that certain sectors within the conglomerates could become burdensome, in part because of their strategy of being highly leveraged, which may have been suitable in the era of subsidized interest rates and highly protected domestic markets but which is not suitable in the current period of deregulation.

It is important to note that even in developed countries, where banks are disciplined by market forces, regulators still keep an eye on ownership concentration. For example, the US Federal Reserve puts vigilance on the possibility of non-banking companies owning or controlling banks (Diaz-Alejandro 1985). Similarly, the Australian authorities impose a 20 per cent limit on bank shares owned by an individual, family, firm, or group (Cranston 1997).

### **3.6.2. Asymmetric information and disclosure requirement**

Banks are required to publish financial reports covering balance sheets, profit and loss statements, contingent liabilities and assets, commitments and off balance sheet transactions every six months. However, depositors and creditors to banks can by no means know the exact quality of banks' assets from these reports, even if the information is accurate. The report cannot accurately guide depositors in measuring risks.

Moreover, there are indications that the information may not always be accurate. For instance, prior to the Bank Duta and Bank Summa fiasco, these two banks had reported fairly sound financial positions. Because of this, the public generally has no confidence in bank reports, as indicated by recurrent runs on banks, often due to unverifiable rumours. For instance, in January and February 1993, a mini run hit several banks, including Bank Bali, one of the soundest. Interest rates cannot be used as a benchmark for measuring risks either, although problematic banks tend to offer exceptionally high interest rates. The problem is that the larger banks tend to gain higher perceived reputation, and therefore can offer lower interest rates despite the reality that some of them are actually relatively weak financially.

### **3.6.3. Lines of credit and evergreening**

Most Indonesian banks grant loans on a *line of credit* basis, which makes them particularly vulnerable to a liquidity squeeze (Cole and Slade 1996). The line of credit system is very different from loans granted on a project or fixed term basis. Under the line of credit system, a borrower can withdraw funds on an over-draft basis up to the maximum level set in the contract. As long as the ceiling is not reached, the borrower is not required to pay the interest and principal. The supposed interest payment is added incrementally to the principal. In other words, the loan is *evergreen*.

There are several weaknesses in this system that make banks vulnerable. First, the loans can appear to be performing, even if borrowers do



not have the capacity to make repayments from their own cash flows. As long as the limit is not exceeded, borrowers can withdraw funds to pay the interest on old loans. Most often, the banks realise that these loans are doubtful or non-performing when the limit is exceeded and borrowers have difficulties making repayments. Second, in such a case the banks face a difficult choice between further extending the limit or realising the loans as non performing. In the former, the banks then realise the interest income but at the same time they may have to bear a higher default risk. In the latter, the banks have to make a loan losses provision which puts pressure on their capital position. In summary, under the line of credit system, it is possible to maintain evergreen (bad) loans as long as the loans grow faster than interest rates. In a macro perspective, a period of lending boom is generally associated with an accumulation of unrealised problematic loans. In other words, data on non-performing loans tends to be under estimated. This is one of the reasons why most leading economists suggest that loan growth is a proxy for banking fragility (see for example Sachs *et. al.* 1996).

### **3.6.4. Connected lending**

The vulnerability caused by the line of credit system was further aggravated by the fact that most of the large private banks were owned by conglomerates and thus tended to lend to themselves. Evergreening of problematic loans was most likely to occur with those granted to affiliates, as the bank managers were instructed by owners to rescue affiliated companies first. The legal lending limit regulation did not seem to be an effective tool to control these rampant self-lending tactics. Based on the published financial statements, which tended to under estimate self-lending, by the beginning of 1995, 78 private banks had exceeded the limit, and several of them had a ratio of connected lending to capital well above 300 per cent. At the onset of the currency crisis, 51 banks maintained this problem.<sup>6</sup>

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<sup>6</sup> The above figures are the author's estimates based on published bank balance sheets.

Loan concentration can increase the fragility of the banking system for two reasons. First, it gives false information to the authorities regarding the true state of the banking system as problem loans are buried in the line of credit schemes. As a result, the authorities are likely to make inappropriate policy responses, especially in a crisis situation. For instance, it is likely that the monetary authorities did not realise the danger of raising the interest rate and squeezing base money in response to the speculative attack in August 1997. That this may have been the case was indicated by fact that Dr. Soedradjad Djiwandono, the then Governor of Bank Indonesia, published two consecutive columns in a major daily newspaper, *Kompas*, on 20 and 21 May 1997, stating that four reputable international institutions, Merrill Lynch, Credit Lyonnaise, Bear Stern, and ING Barings regarded the Indonesian banking system as fairly sound: *rise and shine*. His articles were supposed to counter criticisms made by domestic observers concerning the hidden but explosive problems in the banking system.

Second, concentrated lending reduces the scope for diversification of loan portfolios, making banks more vulnerable to adverse shocks. This is evident in the case of Bank Summa and others. The owner of Bank Summa speculated in real estate and most of the loan portfolio was directed to finance this speculation. This bank was finally forced into liquidation in December 1991 because the owner failed to sell the property.

### **3.6.5. Gambling and fraudulent transactions**

Due to information asymmetry, banks are particularly prone to enter near gambling transactions such as forward foreign exchange transactions. A risk-loving manager can easily abuse depositors' and owners' money for such transactions since he or she will not bear the loss. This is known as the principal-agent problem. The classic example for Indonesia was the Bank Duta fiasco. The Vice President of the bank, who was subsequently tried and jailed, was involved in foreign exchange speculation that caused the bank to suffer losses amounting to \$420 million.

Between 1993 and 1996, similar problems hit several banks such as Bank Dharmala, Lippo Bank, and Bank Internasional Indonesia. However, the losses involved were not so big, were never revealed to the public, and were wiped out by the injection of fresh capital. Again, in 1998, the banking community was rocked with the announcement that Bank Ekspor Impor Indonesia, one of the state banks, made losses of about \$804 million due to forward exchange transactions. But this time the losses were caused more by the volatility in the value of the rupiah, than by pure gambling motives.

Another area susceptible to fraudulent conduct is commercial paper (CP) issued or endorsed by banks. Again the problem is excessive abuse of the banks by the owners. In order to avoid the legal lending limit, banks can endorse CPs issued by affiliated companies. Sometimes, this can involve proxy companies, which physically do not exist and are seemingly unrelated to the banks but actually established by the owners of the bank under somebody else's name.<sup>7</sup> The problem is that CPs are issued on a short-term basis, and used to finance speculation and longer term investments. Default occurs when speculations fail or investments cannot be liquidated except at a loss. As a result, repayment becomes the liability of the bank endorsing the CPs.

One of the many examples was the Bank Pacific case involving issuance of fake CPs for about Rp 2.2 trillion during 1996-1997. The proceeds from the CPs were used to finance investments in the Singapore Stock Exchange, especially on property related shares (*Infobank* no. 229, September 1998). It turned out that the CPs could not be repaid, and the bank was closed by the authorities in November 1997 together with the other 15 banks.

### **3.6.6. Regulatory weaknesses and forbearance**

*Bank as agent of development.* According to the 1992 Banking Act, banks should also function as an agent of development, meaning that the authorities, at their own discretion, can instruct a bank to finance a certain type of activity.

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<sup>7</sup> In such a case, the CPs are typically fake as they are not registered in Bank Indonesia and not rated by Pefindo, the official rating company.

For instance, all banks are required to allocate 20 per cent of their loan portfolio to small and medium scale enterprises, a task that has never been accomplished by any single bank except by Bank Rakyat Indonesia, a state bank traditionally specialising in rural finance. Lately, this function became a handicap for several banks as they could not optimise their financial resources. In the worst case, several state and private banks were instructed to foster risky state-initiated projects, such as the infamous 'national car' project, although the bulk of the funding came from the central bank.

*Scoring system.* Perhaps, the most ineffective supervisory device is the way the soundness of a bank is evaluated. Bank soundness is calculated as the weighted average of bank performance in five aspects generally known as CAMEL (capital, assets, management, earnings, and liquidity). Based on the latest regulation, the weights applied to each element are: capital 25%, asset quality 30%, management 25%, earnings 10%, and liquidity 10%. As argued by Habir (1994), the main problem with this scoring system is that a bank badly performing in one aspect, e.g. capital is negative, could still be rated 'fairly sound' if it could accumulate enough points in the other four aspects. It is more effective if such a bank is rated 'unsound' regardless of performance elsewhere (McLeod, 1999).

*Political interference.* State banks were heavily influenced by political interference in loan allocations. The banks were often instructed to grant loans not only to the so-called priority sectors such as agriculture, and small scale enterprise, but also, more dangerously, to specific borrowers, notably politically connected conglomerates with dubious projects to which professional bankers would normally not be willing to grant loans, even for a single cent. An inter-ministerial investigation indicated that, by 1993, a number of conglomerates had obtained large loans from the state banks on which they paid neither the interest nor the principal (Cole and Slade 1996). For instance, Bapindo (Indonesian Development Bank) had issued loans amounting to \$650 million to the Golden Key group for petrochemical plants, due to pressure from Admiral Sudomo, the Coordinating Minister for Political Affairs and National Security. It was revealed later that these loans were granted without a contract even having

been signed, and most of the funds were diverted for other purposes (*Infobank*, April 1994).

*Forbearance of prudential regulation.* The authorities have implanted sophisticated prudential regulations to safeguard the banking system. But the problem is not so much whether the regulations are good or bad, but more to do with the implementation and enforcement (McLeod 1999, among others). In many cases, serious violations of these regulations did not lead to punishment or fines, let alone cessation of bank operation. Serious punishment of owners and managers was rarely observed; one exception was the Bank Summa fiasco where shareholders were required to bear all of the losses by surrendering one of their most successful business entities, the Astra International group. However, in most cases, the authorities tried to clean up problematic banks by forcing mergers with other banks, or sales to other owners. As a result, the problems were not solved, just transferred to other parties, and of course, the new owners expected preferential treatment and financial help from the authorities for assisting with sorting out the problems. From 1992 to the beginning of 1997, at least 8 banks were resolved this way and most of the troubles caused by the expansion of credit to owners of the banks to finance projects in property (real estate) sector (*Infobank*, no. 211, June 1997). This included Bank Pertiwi in 1992, Bank Sampoerna and Bank Susila Bakti in 1993, Bank Continental in 1994, BIG Bank and Bank Dwima in 1995, Bank Yama in 1996, and Bank Perniagaan in 1997.

This method of dealing with the problem had adverse consequences for the banking system:

- ❖ It tended to accumulate problems, which might have been manageable in a non-crisis situation, making it more difficult to support problematic banks in the wake of the crisis. The closing of the 16 banks in November 1997 was vindication that this kind of approach could not be sustained.
- ❖ This 'soft approach' sent message to other banks that they would not receive harsh treatment and penalties, therefore inducing larger moral hazard problems.

- ❖ In most cases, the central bank had to extend aid to ailing banks in the form of liquidity credit, which tended to jeopardize monetary discipline. For instance, the new owner of Bank Arta Prima, the Artha Graha group, admitted that liquidity credit from the central bank was part of the deal for the take over of the bank from the previous owner, Yayasan Kosgoro, and that without this credit the new owner found it unattractive to own the bank (*Infobank*, July 1997).

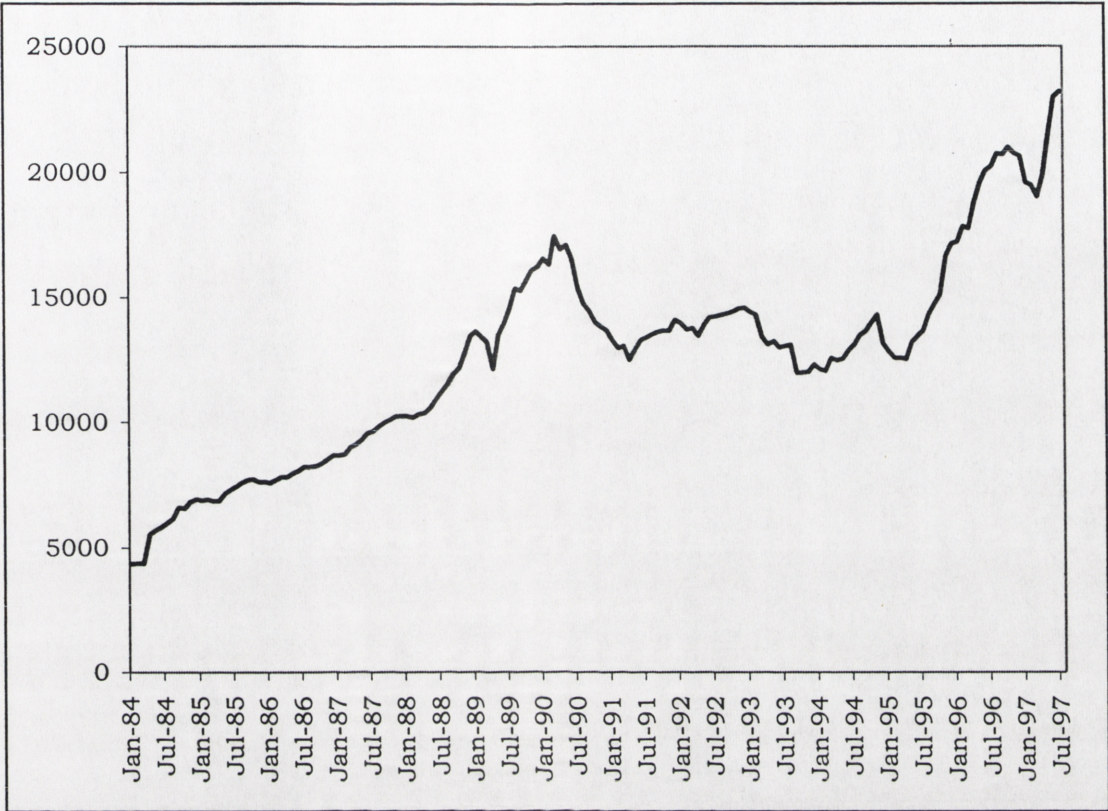
### **3.6.7. Implications for money creation**

This soft approach was actually the legacy of the pre-PAKTO period, where state banks were continuously recapitalised to wipe out losses. Unfortunately, the now greater roles of private banks did not lessen authorities' assistance to commercial banks. Figure 3.4 suggests an increasing trend of central bank claims on domestic banks during 1984 to 1990, mostly in the form of credit programs and liquidity assistance. In 1990, as discussed earlier, credit programs were cut substantially and this is indicated by a drop in such claims from Rp 17 trillion in mid 1990 to about Rp 12 trillion throughout 1991. Throughout the period 1991-1994, the claims stabilised at around Rp 13 trillion, suggesting that the authorities were beginning to discipline themselves. However, from mid 1995, the claims accelerated again at a rate bigger than the pre-PAKTO period. By June 1997, central bank claims amounted to Rp 23 trillion – more than half of reserve money and was by far the most important asset of the central bank after foreign exchange reserves.

The greater reliance on the private banks also changed the structure of borrowings from the central bank. In 1985, these borrowings were almost exclusively by the state banks (see Figure 3.5). However, following the tight monetary policy of 1991, private banks began to become chronic borrowers from the central bank. By June 1997, almost half of the borrowing was by private banks and the other half by state banks. However, this did not mean the state banks became sounder. As will be made clear later, in Chapter 5, the

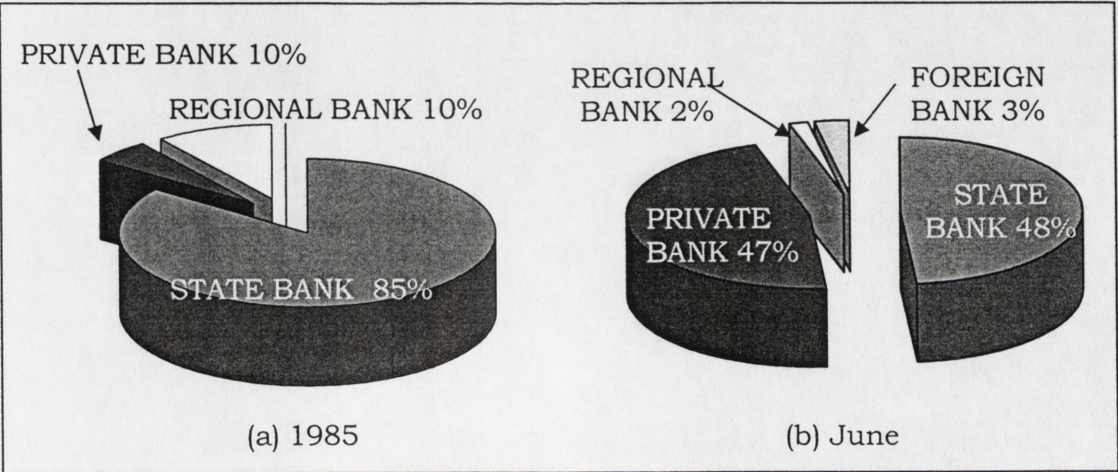


**Figure 3.4.** Central bank claims to domestic commercial banks



Source: BI, Indonesian Financial Statistics.

**Figure 3.5.** Share of bank borrowings from the central bank



Source: BI, Indonesian Financial Statistics.

state banks remained the weakest group. These findings also indicate that the change in market structure, from state bank domination to a greater role of private banks, also shifted the problems to the private banks. Thus, the overall soundness of the banking system may not have been improving.

### ***3.7. Concluding remarks***

In summary, Indonesia's economic policies became more market friendly and contributed to increasing openness and vigorous economic performance. However, three problems stand out (1) persistent deficits in basic balances, (2) the accumulation and structure and foreign debts, and (3) a relatively weak banking sector. The first two problems were interrelated in that persistent current account deficits were largely created by interest payments on foreign debts. Long-term capital flows were insufficient to cover the deficits and therefore short-term capital flows were needed. This made the balance of payments vulnerable to an interruption of short-term foreign capital.

Impressive growth in the banking sector was not accompanied by an overall improvement in bank soundness. During the 1990s, both state and private banks continued to accumulate serious problems, which were buried by the reluctance of the authorities to be tough on banks breaking prudential regulations and, most importantly, by the optimism brought about by rapid economic growth.

These problems suggest that Indonesia might have been vulnerable to the so-called twin crises. The first two problems are a necessary condition in that erosion of confidence on the part of foreign lenders and investors can put heavy pressure on the foreign exchange market. The weak banking sector is the sufficient condition, in that an interest rate hike will not be effective or credible because it can complicate the banking sector.



## **Chapter 4**

### ***A Framework for Analysing Banking Fragility***

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#### **4.1. Introduction**

In Chapter 3 we saw that there were several problems in the banking sector before the crisis. This raises question regarding the role of these problems in the origin and propagation of the crisis. In addressing this issue, it is necessary to adopt both micro and macroeconomic approaches. Moreover, theoretical modelling and quantitative empirical analyses will be employed to provide more definitive answers.

This Chapter proposes a theoretical model for analysing banking fragility, while the empirical test of this model will be presented in Chapter 5. The idea behind this model is that the resistance of a bank to the financial crisis will be determined by its past performance and conduct. More specifically, a bank that stands ready to ignore the possibility of a crisis will be the most vulnerable. Because the crisis affects the balance sheet of banks both directly and indirectly, through the balance sheets of their debtors, a bank that anticipates a crisis will not select asset portfolios that could be adversely affected. For instance, bank managers would avoid issuing foreign exchange loans to domestic oriented firms.

It should be noted from the outset that the model proposed here focuses on the loan market, or the interrelationship between banks and borrowers. The deposit market, or the interrelationship between banks and depositors is abstracted in the model and left for further research.

The rest of this chapter is organised as follows. Section 4.2 discusses firms' investment choices under uncertainty, followed by a discussion on bank lending behaviour in section 4.3, while section 4.4 discusses the relevance of the model for empirical analysis.

## **4.2. Firms' investment choices and uncertainty**

Consider there are  $F$  firms where  $F$  is a big number and each firm needs one unit of capital to be invested in certain productive activities. Firms invest at time 0, and harvest the yield at time 1 (single period). There are two types of project, namely (1) a crisis prone or risky project, denoted by  $R$ , and (2) a non-crisis prone or safe project, denoted by  $S$ . A firm's choice regarding the project is private information and, hence, a lender cannot observe this choice, ex-ante. The choice can only be observed by other agents, ex-post, when the project is completed.

As in Guttentag and Herring (1984), two states of nature can occur at time 1, namely crisis (disaster) and non-crisis (normal). At period 0, the likelihood of a crisis occurring at time 1 is unknown. This is to capture the reality that most major crises cannot be well predicted both in terms of timing or in the severity of the crises.

In their original setting, Guttentag and Herring assume that the output of all firms will collapse to zero or near zero. This seems to be an unrealistic metaphor of the real world for two reasons. First, in their model, the ability of firms and banks to resist the crisis does not correspond to their investment decisions or to prudent measures they took in the previous period. All firms will simply collapse and, therefore, the shield covering banks will have to come from the liquidation of collateral. In fact, the assets portfolio of a bank can also determine bank performance in a crisis situation. In other words, a better metaphor is needed for capturing the effects of pre-crisis conduct and performance of a bank in making it vulnerable. Second, even in a major crisis situation, there are some sectors that remain in good shape. For instance, a severe crisis involving a large devaluation may lead to a collapse of domestic oriented firms with large exposure to foreign debt. On the other hand, export oriented firms can gain from this situation. Therefore, the financial structure of firms does matter in determining the impact of the crisis.

In order to resolve the above problems, the economic activities are specified in two types as outlined above; i.e., crisis prone and non-crisis prone projects. The crisis prone project will fail with certainty if a crisis occurs in period 1. This is to capture two types of susceptibility. First, output may be susceptible to an adverse macroeconomic shock. For instance, real estate, durable goods, and investment goods may be more vulnerable to contraction in aggregate demand. Second, a firm's financial position may be vulnerable to a certain type of shock. Firms with a currency mismatch will be vulnerable to an unexpected devaluation, while firms with high leverage will be vulnerable to an interest rate hike. In this model, both types of vulnerability (output or financial) will be captured by the collapse in output. The reason is that the effect of an increase in costs or liabilities is parallel to a decline in output.

Suppose a crisis does not occur at time 1. The expected output of a crisis-prone project is:

$$(4.1) \quad y^R \begin{cases} \bar{y}^R & \text{with probability } \hat{P}^R \\ 0, & \text{with probability } 1 - \hat{P}^R \end{cases}$$

In other words,  $y^R = \bar{y}^R \hat{P}^R$ . The expected output generated from a non-crisis-prone (safe) project is:

$$(4.2) \quad y^S \begin{cases} \bar{y}^S & \text{with probability } \hat{P}^S \\ 0 & \text{with probability } 1 - \hat{P}^S \end{cases}$$

Therefore,  $y^S = \bar{y}^S \hat{P}^S$ .

Moreover, it is assumed that  $y^R > y^S$ ,  $\bar{y}^R > \bar{y}^S$  and  $\hat{P}^R < \hat{P}^S$ . These assumptions indicate that while project  $R$  gives a higher expected return, it is riskier in a normal period.

Nature may also draw from a disastrous distribution. In the case of a disaster or crisis, the output of project  $R$  will collapse to zero with certainty

(probability equal to 1). On the other hand, the probability distribution of output given by project  $S$  is unaffected by the crisis (equation (4.2)).

Because the probability of a crisis occurring at time 1 is unknown, the decision made by firms regarding project choice is entirely subjective. Let  $\pi_j$  be the subjective probability of firm  $j$  as of period 0 that a crisis will occur at period one. In order to make the analysis simple, this subjective belief takes two extreme values, 0 and 1. If  $\pi_j = 0$ , firm  $j$  absolutely believes that a crisis will not occur. This firm is called an imprudent firm, because it ignores the possibility of a crisis. On the other hand, if  $\pi_j = 1$ , firm  $j$  believes that a crisis will occur with certainty. This firm is called a prudent firm.<sup>1</sup>

Let  $E_{FI}(y^k)$  be the subjective expected output of an imprudent firm. The superscript  $k$  denotes which project is chosen, and subscript  $FI$  indicates the firm is imprudent ( $\pi_j = 0$ ). If a risky project is chosen, the subjective expected output would be:

$$(4.3.a) \quad E_{FI}(y^R) = y^R = \hat{P}^R \bar{y}^R$$

If a safe project is chosen, the expected output would be:

$$(4.3.b) \quad E_{FI}(y^S) = y^S = \hat{P}^S \bar{y}^S$$

Let  $E_{FP}(y^i)$  be the subjective expected output of a prudent firm. If a risky project is chosen, the subjective expected output would be:

$$(4.4.a) \quad E_{FP}(y^R) = 0$$

If a safe project is chosen, the expected output would be:

---

<sup>1</sup> In the real world, the distinction between a prudent and an imprudent firm would not be so extreme. For instance, a firm may have a subjective belief equal to 0.5 while the other have a belief equal to 0.45. In other words, it is more realistic to assume that the value will lie somewhere between 0 and 1. However, this can lead to a more complicated mathematical solution. The objective here is to simplify the real world in

$$(4.4.b) \quad E_{FP}(y^S) = y^S = \hat{P}^S \bar{y}^S$$

In order to specify which project is chosen by a particular type of firm, we need to specify the behaviour of firms regarding risk and return. It is assumed that investment is financed by bank loan and, therefore, firms will have to pay interest rate,  $r$ , at time 1 when the project is completed. Moreover, because the two projects involve risk and efforts are required to produce output, firm  $j$  will choose project  $k$  as long as it can give expected net income of no less than  $\hat{P}^k \rho^k$ . Note that,  $\rho^k$  is necessarily positive in order to give incentive to firms.<sup>2</sup> Let  $E_j^k(NI)$  be the expected income of firm  $j$  choosing project  $k$ . Firm  $j$  will be operating if, and only if,  $E_j^k(NI) \geq \hat{P}^k \rho^k$ .

The net income of firms is evaluated at its expected value. The subjective expected income for a prudent firm is:

$$(4.5) \quad E_{FP}(NI) = \hat{P}^S (\bar{y}^S - 1 - r_{FP}^L) \geq \hat{P}^S \rho^S$$

where  $r_{FP}^L$  is the interest rate paid by a prudent firm. Note that for any given interest rate, a prudent firm will not select a risky project because it is perceived to fail.

*Proposition 1.* All prudent firms will be willing to operate if, and only if,  $E_{FP}^S(NI) \geq \hat{P}^S \rho^S > 0$  or  $r_{FP}^L \leq \bar{y}^S - 1 - \rho^S$ .

*Proof:* If  $r_{FP}^L > \bar{y}^S - 1 - \rho^S$ , there is no incentive for the firm to operate. Because of that, in a competitive market, the interest rate paid by the firm must be equal to  $\bar{y}^S - 1 - \rho^S$ . This implies that any bank expecting prudent firms to be applying for loans cannot set an interest rate exceeding  $\bar{y}^S - 1 - \rho^S$ .

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order to clearly distinguish the implications of decisions made by prudent and imprudent (or less prudent) firms.

<sup>2</sup> If it falls to zero or negative, firms will choose not to operate.

The subjective net income for imprudent firms associated with a safe project is:

$$(4.6.a) \quad E_{FI}^S(NI) = \hat{P}^S(\bar{y}^S - 1 - r_{FI}^L) \geq \hat{P}^S \rho^S$$

If the firms take a risky project, the subjective expected income is:

$$(4.6.b) \quad E_{FI}^R(NI) = \hat{P}^R(\bar{y}^R - 1 - r_{FI}^L) \geq \hat{P}^R \rho^R$$

*Proposition 2.* For any given interest rate, imprudent firms will always prefer a crisis-prone project.

*Proof.* This is clear by comparing (4.6.a) and (4.6.b). Because  $\hat{P}^R \bar{y}^R > \hat{P}^R \bar{y}^S$  and  $\hat{P}^R(1 + r_{FI}^L) < \hat{P}^S(1 + r_{FI}^L)$ , then  $E_{FI}^R(NI) > E_{FI}^S(NI)$  for any given level of loan rate charged to imprudent firms.

Therefore, the model suggests that perception or subjective belief regarding the future state of nature does influence decisions made by firms and, thus, the vulnerability to a crisis. For instance, in a peg exchange rate regime, there may be some firms that perceive the regime will not collapse. Because of that, foreign borrowing without a hedge will be attractive, even if most of their revenue is denominated in domestic currency.

It may also be asked how decisions made by firms will affect the aggregate performance of an economy. Let  $FI$  and  $FP$  be the population of imprudent and prudent firms, respectively, and therefore  $F=FI+FP$ . In a crisis situation, the aggregate output will be equal to  $y^S.FP$ . That is, the more prudent the firm, the less severe the impact of the crisis. In the real world, this will be equivalent to something like: the larger the foreign debt that are not hedged, the more vulnerable the economy to a currency crisis.

Up to this point, the model has captured a particular facet of the real world that the severity of a crisis, or the ability of an economy to resist a crisis, will depend on the share of total output attached to a crisis prone activity. In a big recession, domestic oriented sectors, such as the property sector, will be

hardest hit, because they are prone to a decline in domestic absorption. Moreover, the severity of the decline in domestic output will depend on the share of such sectors in total domestic output before the crisis. On the other hand, such sectors may be considered lucrative in a boom period.

### **4.3. Bank lending decision**

This section focuses on the decision problems faced by banks arising from the uncertainty of whether or not a crisis will occur in the next period. Because the uncertainty has no probability distribution, banks cannot price it. Moreover, subjective perception will determine the lending decisions of a bank.

If a project succeeds, banks receive interest and principal on loans, but they receive nothing if it fail. For simplicity, the interest rate on deposits is normalized to zero. This is because the focus is on the relationship between banks and firms.

Bank owners have to meet a certain amount of equity capital ( $K$ ) to establish a bank. Banks collect deposits ( $D$ ) as liabilities and supply loans ( $L$ ) to firms. Since liquidity is not the main concern, the reserve requirement is abstracted. The balance sheet of a bank can be stated simply as  $L = D + K$ . That is, the total loans of a bank are equal to its equity capital plus deposits. In this setting total loans are also equal to total assets.

The banking system consists of  $B$  banks with equal size and, therefore, the aggregate credit level can be simply stated as  $B.L$ . It is assumed that the size of a bank is bigger than a firm. Because each firm needs one unit of loan, a bank will be able to issue loans to  $L$  firms.

The asymmetric information assumption is maintained. Banks cannot observe which project is chosen by a firm. However, banks know the probability distribution of each type of project. The output of a firm is also verifiable. Moreover, the number of firms taking up risky and safe projects ( $FI$  and  $FP$ ) is also known.

Like firms, each bank sets a subjective probability regarding a crisis. A bank believing that a crisis will not occur at time 1 is called an imprudent bank. There are  $BI$  imprudent banks, and the rest are considered prudent ( $BP=B-BI$ ).

#### **4.3.1. Prudent bank**

Prudent banks believe that a crisis will occur at time 1. They perceive that imprudent firms will not be able to repay their loans. Therefore, these banks will avoid giving loans to imprudent firms. However, because the choice of project is private information, they face difficulties in distinguishing prudent from imprudent firms.

#### **Interest rate and information asymmetry**

The main problem faced by a prudent bank is that it perceives that a crisis will occur at time 1, and therefore it has to provide 100% provision for expected bad loans resulting from the possible collapse of risky projects. If  $F_I$  is the share of imprudent firms in the total population of firms ( $F_I=FI/F$ ), then the probability that an imprudent firm will be picked up by a prudent bank is  $F_I$ . Therefore, the share of expected bad loans in that bank's portfolio is also  $F_I$ .

This has two implications for the bank. First, there is no price mechanism to eliminate the risk associated with risky projects, because the bank perceives that imprudent firms will default. Therefore, the best approach for the bank is to avoid issuing loans to imprudent firms in the first place. This can be done through screening and monitoring. Second, because the bank has to provide a higher provision for bad loans and for the cost of monitoring and screening, the bank will naturally have a higher cost structure than its rival imprudent bank. Therefore, prudent banks may not be competitive. In other words, prudent banks may be driven out of the market by banks that stand ready to disregard the possibility of a disaster (Guttentag and Herring 1984).



In order to see the dilemma faced by prudent banks, moral hazard and credit rationing phenomena resulting from an increase in the interest rate are used. Because the banks expect the crisis, subjective expected revenue will come from the loans allocated to prudent firms. The subjective expected net income of a prudent bank at time 1 is:

$$(4.7) \quad E_{BP}(NI) = \left( (F_p(1 + r_{BP}^L) \hat{P}^S) - 1 \right) L$$

where:  $E_{BP}(NI)$  = subjective expected net income of a prudent bank

$F_p$  = the proportion of prudent firms in the population

$r_{BP}^L$  = loan rate charged by a prudent bank

Equation (4.7) states that the subjective expected net income for a prudent bank consists of two components. The first part of the right hand side,  $(F_p(1 + r_{BP}^L) \hat{P}^S) L$ , is the revenue from loan repayments corresponding to prudent firms. Because the bank expects a crisis, only a fraction of loans ( $F_p$ ) is expected to be repaid. The second part of the right hand side,  $L$ , represents the cost of raising funds which consists of equity and deposits with zero interest rate.

Prudent banks will issue loans as long as it is profitable to do so,  $E_{BP}(NI) > 0$ . In the case of  $E_{BP}(NI) \leq 0$ , the banks will not issue loans (credit rationing). Alternatively, in order to have a positive net income, the banks may increase the loan rate. However, if the interest rate is too high, it may result in a moral hazard problem as safe projects may not be selected by firms.

*Proposition 3.* A prudent bank will offer a low interest rate so that  $1 + r_{BP}^L + \rho^S \leq \bar{y}^S$  and  $E_{FP}^k(NI) \geq \hat{P}^S \rho^S$ .

*Proof.* If a prudent bank sets the interest rate so that  $1 + r_{BP}^L + \rho^S > E_{FP}(y^S)$  and  $E_{FP}^S(NI) \leq \hat{P}^S \rho^S$ , then no prudent firm will apply for loans. In effect, the bank will not issue loans at all because all loan applications will come from

imprudent firms. Therefore, in order to make loans attractive for a prudent firm, the bank has to set a lower interest rate so that  $r_{BP}^L \leq \bar{y}^S - 1 - \rho^S$ .

Up to this point, the model has shown that prudent banks will issue loans as long as  $E_{BP}(NI) > 0$  and  $1 + r_{BP}^L + \rho^S < \bar{y}^S$ . This has important implications for monetary policy. First, monetary tightening can make the economy more vulnerable to a financial crisis as the banks' loan portfolio deteriorates. Second, in the midst of the crisis, an interest rate hike may result in an increase in non-performing loans, due to weakening in the financial positions of low-return but safe projects. Third, this model is also consistent with that of Mankiw (1986), who suggests that due to the fear of moral hazard problems resulting from an exceptional interest hike, banks may not be willing to extend loans. Therefore, there may be a severe contraction in the loan market following a monetary tightening. In other words, a financial contraction may result in output contraction.

## ***Monitoring costs***

In order to avoid extending loans to imprudent firms, the prudent bank has to screen loan applications and monitor the firms so that only safe projects are selected by firms. However, screening and monitoring involves additional costs for the bank. Let  $m$  be the screening and monitoring costs, which hereafter will be called monitoring costs.

It is assumed that, through monitoring, the bank can effectively control firms so that only safe projects are chosen. The subjective expected net income of the prudent bank now becomes:

$$(4.8) \quad E_{BP}^m(NI) = \left( (1 + r_{BP}^L) \hat{P}^S - 1 - m \right) L$$

The bank will have an incentive to monitor if, and only if,  $E_{BP}^m(NI) > E_{BP}(NI)$ , that is the expected return from applying monitoring exceeds the expected return from not doing so. This suggests that:

$$(4.9) \quad m < \frac{1}{F_I}$$

That is, the higher the proportion of prudent firms in the population, the less incentive for banks to monitor.

### ***Collateralised loans***

Collateral has two functions. First, it provides a cushion for banks in the case of firms failing to pay the loan. This is the most commonly known function of collateral. Second, and less known, it can be used as a screening device to avoid moral hazard (Bester and Helwig 1987).

However, collateral may not be effective in order to safeguard banks from failing. Liquidating collateral can take time and incur costs. Moreover, in a crisis situation the value of assets tends to fall sharply (see, for example, Davies 1995). Fisher (1933) argues that the liquidation of assets of insolvent firms during a major crisis can place further pressure on the asset price, leading to a vicious circle called the asset deflation process.

For the purpose of modelling, it is important to acknowledge the potential disaster caused by a fall in asset price during a crisis episode. For simplicity, it is assumed that the value of collateral assets will fall to zero if a crisis occurs. On the other hand, if no crisis occurs, the price of assets is normalized to one.

Because prudent banks expect a crisis to occur at time 1, they would not rely on collateral to safeguard cash flow. In other words, to ensure the safety of loans, the banks will emphasize loan quality rather than collateral through screening and monitoring, as outlined above.

Up to this point, the model has captured several important behavioural characteristics of a prudent bank. It sets interest rates below the expected net return of a safe project, and implements screening and monitoring in order to reduce default risk. In summary, it prefers safe projects even though they imply a lower expected return.

### 4.3.2. Imprudent bank

Imprudent banks are defined as those that stand ready to disregard the possibility of a crisis. Because of that, these banks will be interested in financing risky projects. This is in contrast to prudent banks where safe projects dominate their loan portfolio.

*Proposition 4.* Imprudent banks can set loan rates higher than the loan rates set by prudent banks,  $r_{BI}^L > r_{BP}^L$ .

*Proof.* Because  $\bar{y}^S \hat{P}^S < \bar{y}^R \hat{P}^R$ , it is possible to charge risky projects with a higher loan rate so that  $(1 + r_{BP}^L + \rho^S) \hat{P}^S \leq \bar{y}^S \hat{P}^S < (1 + r_{BI}^L + \rho^R) \hat{P}^R < \bar{y}^R \hat{P}^R$ . Because  $\hat{P}^S > \hat{P}^R$ , then  $r_{BP}^L < r_{BI}^L$ , and  $\bar{y}^S < 1 + r_{BI}^L < \bar{y}^R$ .

This implies that no prudent firms will apply for loans. In other words, all loans from imprudent banks will be allocated to imprudent firms. Moreover, monitoring and collateral become irrelevant for imprudent banks because the interest rate will effectively screen borrowers.

Because imprudent banks do not need to screen and monitor borrowers, expected net income can be simply stated as:

$$(4.10) \quad E_{BI}(NI) = \left( (1 + r_{BI}^L) \hat{P}^R - 1 \right) L$$

By comparing (4.8) and (4.10), it is clear that profits of imprudent banks will be higher than that of prudent banks if a crisis does not occur.

Up to this point, the model has specified different behavioural characteristics of imprudent banks. They tend to set a higher interest rate on loans, allowing risky projects to dominate their loan portfolio. Imprudent banks will specialise in financing risky projects, while prudent banks will prefer safe projects.

Moreover, in a purely competitive deposit market, imprudent banks can drive the other banks out of the market by setting a higher deposit rate. So far,

it has been assumed that banks pay no interest on deposits. If this assumption is relaxed, it will become clear that prudent banks cannot compete in the deposit market for two reasons. First, imprudent banks set higher loan rates so they will be able to offer higher deposit rates. Second, prudent banks have to pay monitoring costs, which further lowers the deposit rates they can offer. However, the above implication may not apply if it is further assumed that depositors are also divided into two groups, prudent and imprudent depositors. This issue is left for further research.

## **4.4. Implications**

### **4.4.1. Crisis and non-crisis scenario**

Note that it has been assumed that the objective (actual) probability of a crisis is not known. Because of this uncertainty, firms and banks make investment decisions based entirely on their subjective belief. In this light, it can only be known which decision is right ex-post, when the state of nature is fully known at period 1, crisis or no-crisis.

When a crisis occurs, the output of imprudent firms will fall to zero and no payment will be made to banks. Thus imprudent banks will collapse. On the other hand, prudent firms and banks will be unaffected by the crisis. In this case, the expected return of prudent firms and banks is determined by equations (4.4.b) and (4.8), respectively.

It is important to note that the susceptibility of the economy to a crisis does not only depend on decisions made by firms, as discussed in section 4.2, but also on whether bank decisions are prudent or not. After all, it takes two to tango. To see this clearly, consider the following two cases.

First, if all banks disregard the possibility of a crisis, then only risky projects will be financed. This is an extreme case of susceptibility where all banks and firms are exposed to a crisis. In this case, banks and firms become insolvent. Thus, there will be both a real and financial sector crisis.

Second, if all domestic banks are prudent, they will only issue loans to safe projects. Imprudent firms may be able to seek foreign loans, given that foreign creditors are not as prudent as domestic banks. In this case, only imprudent firms will collapse. Prudent firms and banks will remain unaffected by a crisis. Thus, there will be a less severe real sector crisis without a financial sector crisis.

If a crisis does not occur, imprudent firms and banks will perform better. The net income of imprudent firms is determined by equation (4.6.b) and that of prudent firms is determined by equation (4.4.b). Although  $r_{BI} > r_{BP}$ , it must be the case that  $E_{FI}^R(NI) > E_{FP}^S(NI)$ . Otherwise, no firm would be willing to take a risky project.

The net income of prudent and imprudent bank when the crisis does not occur is described by equations (4.8) and (4.10), respectively. Comparing the two equations gives  $E_{BI}^R(NI) > E_{BP}(NI)$ . Thus, imprudent banks perform better.

#### **4.4.2. Relevance for empirical studies**

An empirical test of the model developed in this chapter will be undertaken in the next chapter. Before proceeding to that exercise, it is important to highlight several implications that can be inferred from the model for the empirical analysis. Several qualifications should also be made due to oversimplification of the real world and hence overstatement of the implications of the model.

First, the model has simplified the complexity of real world into a binary world, risky versus safe or prudent versus imprudent. In the real world, a continuum of risk can be observed, from projects with no risk to absolutely risky projects. Thus, the terms crisis-prone and non-crisis-prone projects should be interpreted cautiously in the empirics. It would be more realistic if vulnerability to a crisis was defined in terms of relative exposure. For instance, the higher the foreign debt accumulated in the non-tradable sector, the more prone the sector to a currency crisis.

Second, the model implies that the susceptibility of a firm or a bank depends on decisions made before a crisis. This is reflected in the terminology used in the model, prudent versus imprudent firms or banks. For the empirics, this should be interpreted as the performance of a bank (firm) during a crisis will depend on its conduct and performance before the crisis. For instance, a bank that allows non-performing loans to be buried by means of “ever-greening” will be vulnerable to an interest rate hike.

Third, the model implies that the severity of a crisis will depend on the proportion of firms and banks opting for crisis-prone projects. In other words, the bigger the problems accumulated in the real and banking sector, the more vulnerable the economy.

Fourth, the model defines “crisis” in a broad manner. In an actual crisis situation, a multiple adverse shocks may be observed like a large currency devaluation, with a sharp fall in assets price, an interest rate hike and bank runs. Therefore, it is necessary to specifically define bank characteristics in relation to each shock. In other words, the term “vulnerability” should correspond to a specific shock.

Fifth, the terms ‘subjective choice/decision’ should not be overstated. This is just to simplify a vast array of differences in expectation about the future states of the economy amongst different agents. Moreover, in making anticipations, a set of ‘objective’ information may be used, but the same information may be interpreted differently by different agents. For example, a boom in the asset market may viewed as a good thing. But it may also be perceived as an initial stage of an incoming collapse. Indeed, the model tries to capture the differences of interpreting information in relation to decision making process.

## **Chapter 5**

### ***Was The Banking Sector Weak Before The Crisis?:***

#### ***A post-mortem analysis***

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##### **5.1. Introduction**

The objectives of this chapter are twofold: to provide an empirical test of the view that the banking sector was fragile, and to determine the factors contributing to banking fragility by using individual bank balance sheet data. In order to achieve these objectives, the performance of banks during the crisis is examined in relation to their conduct and performance before the crisis. In other words, a test will be established to determine whether banks' financial position during the crisis can be explained by their pre-crisis characteristics.

This test is based on the model developed in Chapter 4, which suggests a definite relationship between the pre-crisis performance and conduct of a bank with its ability to withstand adverse shocks during a crisis. If the model is supported by the empirical analysis, there is a solid basis for explaining why policy responses during the crisis seem to have been ineffective in deterring currency speculation and in minimizing the damage to the economy. Moreover, a weak-banking sector tends to propagate a currency crisis and becomes a full-blown economic and financial crisis, where the payment system breaks down (Mishkin, 1996).

The implied hypothesis derived from the model may be described as follows. In considering a situation where all banks face the same adverse macroeconomic shocks, there is a need to determine the factors characterising the ability of a bank to withstand the shocks. A particular group of banks might have accumulated some sort of fragility before the crisis, so that the shock may have exposed their weaknesses. On the other hand, if the data cannot confirm this hypothesis, it may be concluded that the shocks hit banks



randomly and their past performance and conduct had nothing to do with their ability to minimize the adverse impacts of the shocks on their financial position during the crisis. In other words, banks that succumbed were simply the unlucky victims of the crisis. Given this, it may be necessary to look for other explanations for their insolvency, such as macro-monetary management and the presence of deposit runs during the crisis.

The remainder of this chapter is organised as follow. First, the empirical model and econometric procedures are presented, followed by a discussion on variable definition and data sources. The key empirical findings are then discussed in the context of the structure, conduct, and performance characteristics of the Indonesian banking system in the lead up to the crisis. The final section presents key inferences and policy implications.

## ***5.2. Empirical model and econometric procedures***

The empirical framework used to determine factors contributing to banking fragility is a “probit” or “normit” model.<sup>1</sup> The regression model is specified as:

$$(5.1) \quad y_i^* = \beta_0 + \sum_{j=1}^k \beta_j x_{ij} + u_i$$

where  $y_i^*$  is commonly known as a “latent” variable. It is unobserved, and therefore is replaced by an observed dummy variable,  $y_i$ , such that:

$$(5.2) \quad y_i \begin{cases} 1 & \text{if a bank is solvent} \\ 0 & \text{if a bank is insolvent} \end{cases}$$

A bank is said to be solvent if it had a capital adequacy ratio (CAR) equal to, or more than, zero during the crisis. A bank is said to be technically bankrupt if the CAR fell below zero. Because the shocks that occurred during the crisis were so large, a bank that maintained its CAR above zero can be called a

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<sup>1</sup> Probit and logit models have been extensively used for charactering the determinants of as well as predicting bank failures (see for example Gonzalez-Hermosillo 1999).

‘resistant’ bank. Therefore, the latent variable can be defined as ‘the ability to resist the crisis’.

The vector of explanatory variables,  $x_{ij}$ , represent the performance and conduct of a bank during the pre-crisis period. If these pre-crisis indicators can significantly explain the variation in  $y_i^*$ , it can be claimed statistically that  $x_{ij}$  is detrimental for bank performance during the crisis. In other words, the ability of a bank to resist the crisis was subject to its conduct and performance during the pre-crisis period. Technically speaking, this requires relatively small error terms,  $u_i$ , in the sense that the variation in  $y_i^*$  mostly belongs to the variation in  $x_{ij}$ .

Where  $u_i$  is so large,  $\beta_{ij}$  would not be significant and it can be statistically claimed that the variation in  $y_i^*$  was largely due to variation in  $u_i$ . In other words, the crisis randomly hit any bank. Hence, bank failures commonly observed during the crisis were not attributable to structural weaknesses of the sector.

In order to accommodate the above idea, the Probit estimation technique is used. In Shazam, the probability of occurrence of the dependent variable,  $P(y=1)$ , is described as:

$$(5.3) \quad P_i = F(y_i^*) = F\left(\beta_0 + \sum_{j=1}^k \beta_j x_{ij}\right) = \int_{-\infty}^{y_i^*} \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{i^2}{2}\right) di$$

where  $F(.)$  represents the cumulative normal density function. The index  $y_i^*$  is a linear function of  $x_{ij}$ , but the probabilities are not; therefore, the coefficient must be interpreted carefully.

The estimation is done by maximising the value of the log likelihood function, which is defined as:

$$(5.4) \quad L(\beta) = \prod_{y_i=1} P_i \prod_{y_i=0} (1 - P_i)$$

The maximization of equation (5.4) is accomplished by non-linear estimation methods. Because it is a concave function, it has a unique solution and trial and error procedures can start from any value.

The estimated coefficients tell the effect of a change in the explanatory variable on the index,  $y_i^*$ , rather than on the dependent variable,  $y_i$ . The effect on the dependent variable can be computed as:

$$(5.5) \quad \frac{\partial P_i}{\partial X_{ij}} = f(\beta_j x_{ij}) \beta_j$$

where  $f(\cdot)$  is the normal density function. It is clear from equation (5.5) that the effect on the dependent variable is different for each observation.

Alternatively, the elasticity can be used, and is defined as:

$$(5.6) \quad E_{ij} = \frac{\partial P_i}{\partial X_{ij}} \frac{x_{ij}}{f\left(\beta_0 + \sum_{j=1}^k \beta_j x_{ij}\right)}$$

Since the elasticity is different for every observation, either elasticity at means or weighted aggregate elasticity may be used. The elasticity at means is defined as:

$$(5.7) \quad E_j = \frac{\partial P}{\partial \bar{x}_j} \frac{\bar{x}_j}{f\left(\beta_0 + \sum_{j=1}^k \beta_j \bar{x}_j\right)}$$

The weighted aggregate elasticity is computed as:

$$(5.8) \quad \bar{E}_j = \frac{\sum_{i=1}^N \hat{P}_i E_{ij}}{\sum_{i=1}^N \hat{P}_i}$$

A test of the null hypothesis that all  $\beta_j$  are zero can be carried out by using the log-likelihood as follows:

$$(5.9) \quad LR = 2[L(\beta) - L(0)]$$

where  $L(0)$  is defined as:

$$(5.10) \quad L(0) = S \ln\left(\frac{S}{N}\right) + (N - S) \ln\left(\frac{N - S}{N}\right)$$

where  $N$  is the number of observations and  $S$  is the number of successes observed ( $y_i = 1$ ).

Various  $R^2$  can be computed, and the most appealing one can be selected. The Maddala  $R^2$  is computed as:

$$(5.11) \quad R_M^2 = 1 - \exp\{2[L(0) - L(\beta)]/N\}$$

The Cragg-Uhler  $R^2$  is defined as:

$$(5.12) \quad R_{CU}^2 = \frac{1 - \exp\{2[L(0) - L(\beta)]/N\}}{1 - \exp\{2L(0)/N\}}$$

The McFadden  $R^2$  is:

$$(5.13) \quad R_{MF}^2 = 1 - [L(\beta)/L(0)]$$

The Chow  $R^2$  is:

$$(5.14) \quad R_C^2 = 1 - \frac{\sum_{i=1}^N (y_i - \hat{y}_i)^2}{\sum_{i=1}^N (y_i - \bar{y})^2}$$

As an alternative to  $R^2$ , a *prediction success table* is used to measure the overall fit of the model. The table shows the numeric counts of predicted versus actual using the following decision rule. An observation  $i$  is predicted to be  $y_i = 0$  if  $y_i^*$  is less than zero or  $F(y_i^*)$  is less than 0.5. Otherwise the observation is predicted to be  $y_i = 1$ . The table is constructed as follows:

		ACTUAL	
		0	1
PREDICTED	0	N11	N12
	1	N21	N22

where N11 and N22 are the number of right predictions, whilst N12 and N21 are the number of false predictions.

### 5.3. Variable definition

The dependent variable is measured as a dummy variable, which represents whether or not a bank was solvent during the crisis period. A bank is said to be solvent if it had capital adequacy ratio (CAR) equal to, or more than, zero based on the results of due diligent examination conducted by IBRA in March 1999. The rest of the banks are classified as insolvent, which includes banks that had CAR less than zero, and banks that were liquidated, closed or taken over by the authorities before September 1998. Note that the CAR for banks liquidated and taken over is not available. It was clearly stated by the authorities that bank closures were mainly due to insolvency. It is not clear whether they were insolvent or not when the banks were taken over (BTO). However, based on our experiment, the BTO's are best suited to be included as insolvent banks.<sup>2</sup> Note that if the CAR for all banks is known, an OLS estimation can be run, instead of a Probit model.<sup>3</sup>

A vector of 21 explanatory variables is considered. Variable notations and definition (with expected sign in bracket) are listed below.

ASEG	asset growth, average 1991-1996, (-)
CREG	loan growth, average 1991-1996, (-)
STATUS	dummy status of bank, foreign exchange bank =1, otherwise=0
C1	ownership concentration, 1996, (-)
TRF	cost of raising funds, average 1994-96, (-)
ECAR	equity capital to assets ratio, average 1994-96, (+)
LLL	ratio of connected lending to equity capital, average 1994-96, (-)

<sup>2</sup> Two separate regressions were run where the BTO's are included in the insolvent group in the first regression and then as solvent banks in the second regression. It turns out that the first regression is the better predictor, in the sense that all of the BTO's are predicted as insolvent.

<sup>3</sup> A number of OLS regressions are run, but they are not satisfactory. The exclusion of liquidated and taken over banks reduces the number of observation to 103. Note that liquidated banks were the most fragile, thus the exclusion tends to underestimate the coefficients.

DLLL	dummy of LLL, more than 20 per cent = 1, otherwise = 0, (-)
ROA	return on assets, average 1994-1996, (+)
ROE	return on equity, average 1994-1996, (+)
BPLAC	placement with other bank, average 1994-1996, (-)
SECU	security holding as percentage of total assets, average 1994-96, (-)
FASS	foreign currency denominated assets as percentage of total assets, average 1994-96, (+/-)
FLIAB	foreign currency denominated liabilities as percentage of total assets, average 1994-96, (-)
NOP	net open position, FASS-FLIAB, average 1994-96, (+/-)
HI	relative size of bank, 1996, (+/-)
LIQU	ratio of liquid assets to liquid liabilities, average 1994-96, (+)
RESR1	ratio of reserves to total deposits, average 1994-96, (+)
RESR2	ratio of reserves to total liabilities, average 1994-96, (+)
LDR	loan to deposit ratio, average 1994-96, (-)
CRONY	dummy variable, bank owned by a crony = 1, otherwise 0.

Assets growth (ASEG) and loan growth (CREG) are alternative proxy variables for asset quality. Note that several authors have suggested that higher loan growth is a robust proxy for a deterioration of asset quality of banks (see for example Sachs *et.al.* 1996, Athukorala and Warr 1999). Banks may not be able to build up expertise to keep pace with the increasing need of credit appraisal. With a higher loan growth, banks may have to enter a new unfamiliar market. Moreover, it is increasingly difficult to distinguish good from bad risk applicants, since it is easier for debtors to find new loans for servicing old loans. Therefore, with higher loan growth, non-performing loans tend to be underestimated.

The variable STATUS identifies whether a given bank has foreign exchange licence. Foreign exchange (forex) banks are likely to be more vulnerable to exchange rate shocks while non-forex banks are more sensitive to a hike in the domestic interest rate. If the coefficient on the STATUS is negative, the currency depreciation that occurred during the crisis had a greater impact on bank insolvency than an interest rate hike.

Ownership concentration (C1) is measured as the percentage of share capital owned by the largest owner.<sup>4</sup> For instance, if two parties own a bank with 60 per cent and 40 per cent shares, then C1 is 60 per cent. It is expected that banks with low C1 will have better internal control, in the sense that abusive conduct by an owner may jeopardize the interest of other owners, and therefore they will prevent this from happening. This is not so, if all owners collectively abuse the bank.

Connected lending (LLL) is defined as loans issued to parties or firms that are related to owners or management of a bank relative to equity capital.<sup>5</sup> As an alternative, a dummy variable called DLLL can be used. For connected lending that exceeds the legal lending limit ( $LLL > 20$  per cent), DLLL is equal to one, otherwise it is zero. If the sign of the coefficient on LLL or DLLL is negative, it may be concluded that the quality of loans issued to connected parties is inferior to that of other loans.

The cost of raising funds (TRF) is measured as total interest payments divided by total liabilities. There are two possible explanations why a bank has a higher TRF. First, depositors and lenders may perceive that the bank is riskier than other banks, and demand a higher risk premium. This bank may then charge higher interest rates to borrowers, so that it can pay a higher interest rates to its depositors and lenders. As argued by Stiglitz and Weiss (1981), higher interest rates may result in a larger problem of moral hazard. Second, the bank faces serious financial problems, so that it has to acquire extra cash. For instance, non-performing loans may result in an interruption of cash flow, making it difficult for the bank to service the withdrawal of deposits. In order to attract more deposits, and prevent withdrawal, the bank may decide to offer a higher interest rate. In either case, a higher TRF may reflect that depositors and lenders face a higher risk. Therefore, the sign on TRF is expected to be negative.

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<sup>4</sup> Saunders, Strock and Travlos (1990) find that there is strong relationship between ownership structure and bank risk taking in the US.

<sup>5</sup> Latin American experiences indicate that connected lending was one of the key elements contributing to banking fragility (Diaz-Alejandro 1985)

Return on assets (ROA) is measured as pre-tax net profit divided by total assets. Meanwhile, return on equity (ROE) is defined as profit divided by equity capital. ROA and ROE are important in two respects. First, they provide a gross picture of the overall performance of a bank during the pre-crisis period. Some of the profit may be retained, and therefore provide a cushion against an adverse shock. Second, a higher ROA may represent better assets quality in the sense that the proportion of performing assets may be higher or give a higher return. However, it could also mean that the bank took riskier projects that give extra profits before the crisis. Thus, the sign for the coefficient on ROA or ROE can be either positive or negative.

Placement on other bank (BPLAC) is measured as total funds placed in other banks as a proportion of total assets.<sup>6</sup> This may be an approximation for contagious bank failure. Banks with higher BPLAC should be more vulnerable to the failure of other banks. Although, it is not clear which bank the funds were allocated to, our intuitive guess is that most of the funds were allocated to problematic banks, or at least to banks with a liquidity shortage. Since February 1998, such placement is fully guaranteed by the authorities. However, it was later revealed that it was difficult to withdraw such placements from banks that were liquidated or taken over by the government.<sup>7</sup> Therefore, such placement still incurs a risk for the creditors.

Security holding (SECU) is defined as total security held by a bank as a percentage of total assets.<sup>8</sup> It contains both safe and risky assets. Safe assets include central bank certificates (SBI) and bonds issued or guaranteed by foreign governments. Risky assets include common stocks, money market securities (SBPU), and bonds issued by firms, either domestic or foreign. If the sign on SECU is negative, the value and quality of the assets may have declined during the crisis. In other words, the crash in the stock market and the deflation in firms' assets adversely affected banks.

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<sup>6</sup> See Davis (1995, Chapter 5) for extensive theoretical discussion on systemic risks.

<sup>7</sup> A famous case is "Baligate" where Bank Bali used politically connected parties to claim the fund from IBRA.

<sup>8</sup> For the case of Japan, the fall in asset prices led to bank failures (see for example Kanaya and Woo 2000)



Foreign exchange risk in bank portfolios can be captured in terms of three variables, namely foreign exchange assets (FASS), foreign exchange liabilities (FLIAB) and the net open position (NOP).<sup>9</sup> Theoretically, NOP is more appropriate to measure the risk since it measures currency mismatch. As alternatives to NOP, FLIAB or FASS can be used. The idea for using FLIAB or FASS is that, given the big depreciation in the rupiah during the crisis, the quality of banks' assets denominated in foreign exchange may have deteriorated. In other words, even if banks were able to pass exchange rate risks to debtors, they still faced the risks indirectly due to the increase in non-performing loans.

There are four widely used indicators of liquidity mismatch of banks, namely the ratio of liquid assets to liquid liabilities (LIQU), reserves to deposits ratio (RESR1), reserves to total liabilities ratio (RESR2), and loan to deposits ratio (LDR). In the absence of strong theoretical reasoning to prefer one over the others, statistical significance will be used to select the 'best' indicator.

The CRONY variable is intended to capture whether or not banks owned by cronies tended to be more vulnerable than other banks. A "crony bank" is defined as a bank owned by: (1) a family member of the former President Soeharto, or (2) parties (either persons or companies) that were directly involved in business with family members. Family members include Soeharto himself, his sons and daughters, his wife, his grand children, his brothers and sisters, his stepbrother and sisters, his brothers/sisters in law, and his sons/daughters in law. Parties with direct business ties to family members include persons and companies such as Muhammad Hasan (Kalimanis group), Eka Tjipta Widjaja (Sinar Mas Group), Prayogo Pangestu (Barito Pacific group), Salim group, Lippo group, Peter F Gontha, and Subentra group.

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<sup>9</sup> Goldstein (1998) argues that currency mismatch was an important factor characterising the East Asian financial crisis.

## 5.4. Data sources

At the onset of the crisis, there were 160 private banks in Indonesia, 140 of these are covered in this study. In 1996, the total assets of these sample banks accounted for 98 per cent of the total assets of all private banks. There are 58 banks in the sample that remain solvent, while the rest have been analysed as insolvent, closed or taken over by the government.

The construction of the dependent variable is based on “due-diligent” results published by Bank Indonesia (BI) in March 1999. Banks that were taken over or liquidated prior to September 1998 are treated as insolvent banks.

All explanatory variables are constructed from financial reports relating to individual banks, collected from a number of sources, including BI publications, *Infobank* database, and *Bisnis Indonesia*, the country’s leading daily business newspaper. These data reflect the financial posture and performance of individual banks during the period between 1991-1996.

Note that the empirical analysis covers private banks only. Foreign and joint venture banks are not included in the estimation, because they are not subject to due diligence and therefore there is no information regarding their solvency. Regional development banks are also excluded from the estimation, partly due to the lack of consistent financial data. It was difficult to obtain their financial reports for periods before 1995. The state banks were not included in the estimation due to their poor performance both before and during the crisis period. Note that all of them become insolvent during the crisis, indicating that they were the most vulnerable. The inclusion of these banks in the estimation tended to hamper statistical properties of the model, presumably because they had distinctive financial structures compared to private banks. Unfortunately, because there were only seven state banks, it is impossible to do a separate estimation. However, the fact that they all failed is a proof that they were the most vulnerable, thereby negating the need to give further statistical evidence.

## ***5.5. Model selection and statistical properties***

This section presents the final results, mainly chosen based on the number of right prediction,  $R^2$ , and t-ratio on each coefficient. The model selection procedure followed in arriving at these results is described as follows.

### ***Step 1***

There was a need to select or exclude redundant explanatory variables. There are five cases for this: between ASEG and CREG, between LLL and DLLL, between ROA and ROE, between NOP, FASS and FLIAB, and between LIQU, LDR, RESR1 and RESR2.

For the first case, between ASEG and CREG, CREG was finally selected, since it gives better predictive power to the model. In term of significance level, both are significant at 5 per cent level. Both variables are highly correlated with a coefficient of correlation equal to 0.86.

For the second case, DLLL was selected instead of LLL. DLLL gives a much higher rate of right predictions and is significant at 1 per cent level. On the other hand, LLL is only significant at 20 per cent level. The problem with LLL is that the data range is too wide, between 0 per cent and 1,654 per cent. Thus, it is difficult to get a robust estimate.

For the third case, ROA is chosen. Although both ROA and ROE are only significant at 20 per cent level, ROA was chosen because it improves the prediction performance of the model.

For the fourth case, FLIAB was chosen because it is superior in terms of prediction and t-ratio. NOP is not significant even at 20 per cent level, so it was dropped out. Note that the net open position is one of the prudential measures preventing banks from taking excessive risks on foreign exchange positions, and thus the variations across foreign exchange banks are relatively small. Because of that, it is not surprising that the coefficient attached to NOP is not significant. FASS is highly correlated with FLIAB, where the coefficient of

correlation is 0.968. Because of that, there is little difference in using either of them. FLIAB is only marginally superior to FASS in terms of t-ratio and improvement in prediction. The former is also more appealing because it measures the obligation to repay foreign exchange denominated liabilities. Since almost all of the banks do not possess a currency mismatch, it is the burden of repaying the liabilities that can push the banks under in the case of increasing loan defaults due to a currency mismatch on the part of the banks' borrowers.

For the fifth case, LIQU was used on the basis of a better t-ratio. LIQU is significant at 10 per cent level, while RESR1, RESR2, and LDR are only significant at 20 per cent level.

Therefore, 8 variables were dropped from the model, namely, ASEG, LLL, ROE, NOP, FASS, LDR, RESR1 and RESR2. The model was then estimated and further refined using the remaining variables.

## *Step 2*

There are now only 13 explanatory variables in the model. One of them, HI, was dropped because it is correlated with FLIAB. The exclusion of this variable increases the significance level of the other variables. FLIAB becomes insignificant when HI is included in the equation, which indicates a colinearity problem. The coefficient correlation between FLIAB and HI is 0.64. The value of LR-test for variable exclusion is 1.58, indicating that HI is insignificant and can be excluded from the model.

On the other hand, STATUS, C1, TRF, ROA and SECU were not excluded from the model, even though they are not significant at 10 per cent level. They were included because they improve the predictive power of the model. Therefore, there are now 12 explanatory variables in the final estimation.

Final Estimates

The final results are presented in Table 5.1. In order to facilitate interpretation of the results, the average value of each independent variable is presented in Table 5.2.

Table 5.1. Determinants of Banking Vulnerability

Variable	Coefficient	t-ratio #	Weighted Elasticity
CREG	-1.3096	-2.5014 **	-0.26621
STATUS	-0.3754	-0.9288	-0.08378
C1	-0.0096	-1.3671	-0.26914
TRF	-10.1490	-1.5728	-0.64408
ECAR	6.4901	2.1395 **	0.43936
DLLL	-1.3446	-4.1492 *	-0.31559
ROA	19.9250	1.3467	0.12336
SECU	-3.7014	-1.2350	-0.09119
BPLAC	-1.9205	-1.6497 ***	-0.18220
LIQU	0.3703	1.8417 ***	0.10581
FLIAB	-5.5043	-1.9600 **	-0.10950
CRONY	-1.3461	-1.9773 **	-0.03976
CONSTANT	2.6734	2.0150	1.29360

LR-test \* = 88.6368 ( $\chi^2$ , with 12 DF)

Maddala R<sup>2</sup> = 0.4691

Cragg-Uhler R<sup>2</sup> = 0.6317

McFadden R<sup>2</sup> = 0.4664

Chow R<sup>2</sup> = 0.5180

	Prediction success table		
	Actual		
	Predicted	0	1
	0	72	10
	1	10	48

Note:

# The level of statistical significant (two sided) of the regression coefficient is denoted as: \* 1 percent, \*\* 5 percent, and \*\*\* 10 percent

**Table 5.2.** *Average value of explanatory variables for each group of banks*  
(%, unless otherwise indicated)

<b>Variables</b>	<b>Insolvent banks</b>	<b>Solvent Banks</b>
ASEG	47.61	37.54
CREG	50.99	37.17
TRF	13.01	13.05
ASSETS (Rp billion)	2,295	394
LOANS (Rp billion)	1,613	258
ECAR	8.09	12.68
LLL	104.03	22.67
DLLL (number of banks)	65	13
ROA	1.17	1.79
BPLACE	16.18	20.56
SECU	11.75	5.95
LDR	113.52	107.32
FLIAB	23.08	11.16
FASS	21.86	9.88
NOP	1.22	1.28
C1	62.98	54.01
LIQU	50.00	102.78
RESR1	5.26	6.79
RESR2	4.48	5.79
CRONY (number of bank)	20	2
Number of observations	82	58

The estimated equation is statistically significant at one per cent level in terms of the likelihood ratio (LR) test. Moreover, the number of right predictions is 120 out of 140 observations. In other words, the model incorrectly predicts only 20 observations. Four alternative  $R^2$  are presented in the table; they range between 0.46 and 0.63, which is quite high for a cross-section regression of this nature. In sum, the results suggest a strong

relationship between banks' performance during the crisis and their performance and conduct prior to the crisis.

In terms of the standard t-test, DLLL is significant at 1 per cent level and CREG, ECAR, CRONY, and FLIAB are significant at 5 per cent level. BPLAC and LIQU are significant at 10 per cent level. Less convincingly, perhaps, ROA, C1 and TRF are only significant at 20 per cent level.

## **5.6. Discussion**

The coefficient of loan growth (CREG) has a negative sign, indicating that banks with relatively higher loan growth possibly had relatively weaker loan portfolios. As discussed, banks with high loan growth may not have been able to build up personnel competence for assessing loans and appraising projects. Moreover, competitive pressures, following the deregulation in 1988, may have lowered banks' profitability (Kenward, 1997). Faced with this squeeze, banks might have had to lower their costs and provision for bad loans. At the same time, they might have had to enter new areas they were not familiar with, imposing higher loan risks.

From Table 5.2, it is clear that the credit growth of insolvent banks (50.99 per cent) was higher than that of solvent bank (37.17 per cent). This is consistent with the assets growth of the two groups. Moreover, on average the size of insolvent banks is larger than that of solvent banks. Average total assets for solvent and insolvent banks are Rp 394 billion and Rp 2,295 billion, respectively. In a more competitive and less protected environment, larger banks expand more rapidly by opening new branches, attracting new deposits, and granting loans –often to themselves.

The coefficient on ROA is only significant at the 20 per cent significance level. There are two possible explanations as to why ROA fails to achieve statistical significance. First, this poor result reflects the problem associated with the line of credit schemes, where loans were often buried by further rising loan ceilings. In such a case, banks realise interest income from supposedly

non-performing loans. However, when the crisis hit the banks, it was difficult for them to extend the loans and loan losses had to be realised. Second, high profitability can indicate either that a bank is sound or was taking large risks that were profitable in the pre-crisis period, but incurred large losses once the crisis hit. Therefore, it is not surprising that ROA has a low t-ratio.

Solvent banks tend to have much higher equity capital (ECAR) than insolvent banks. The sign of the coefficient on ECAR is positive and the coefficient is significant at 5 per cent level. This means that banks with a higher ratio of equity capital to total assets were in a better position to accommodate deterioration in asset quality during the crisis. Moreover, higher capital can prevent bank owners from engaging in risky activities (see Fane 1998, among others). As a higher proportion of asset portfolios is financed with equity capital, banks will be more cautious in selecting assets mix. In essence, there is strong evidence that capital adequacy is one of the key determinants of bank soundness during the crisis.

The coefficient on the cost of raising funds (TRF) is negative, which suggests that banks with higher TRF were more vulnerable. However, the coefficient is only significant at the 20 per cent level, suggesting that there seems to be no strong statistical ground for supporting the above view. There are several factors that may lead to this insignificant coefficient.

First, weak banks may not want to signal their financial risks through interest rates as it could trigger a deposit run. Instead, they often offer lottery schemes as an alternative to interest rates (Pangestu 1996). Second, larger banks may have higher credibility for attracting deposits due to their close link with the centre of power and major business conglomerates. As discussed, insolvent banks had larger total assets. Marshall (1994) found that most of the larger private banks offered lower interest rates. Third, increasing deposit rates may attract retaliation from other banks. Note that interest payments account for about 91 percent of the total cost of banks, on average, and thus a further increase would create further problems.



Because risks are not reflected in the interest rates, or not correctly priced, depositors and lenders suffer information asymmetry in that they cannot distinguish weak from sound banks.<sup>10</sup> Under such circumstances, the banking system is prone to idiosyncratic runs. As discussed in section 3.6, unverified rumours triggered runs even on sound banks in several occasions.

The coefficient attached to the liquidity ratio (LIQU) is significant at the 10 per cent level, and has the expected (positive) sign. Liquidity is important for preventing bank failure for two reasons. First, a large currency depreciation may result in an increase in non-performing loans which, in turn, may interrupt banks' cash flow. Second, most of the private banks had been experiencing deposit runs since December 1997. Because of these two factors, a higher proportion of liquid assets may have provided a cushion against liquidity shortage. Note that in the case of liquidity shortage, banks may seek liquidity from the inter-bank market or from the central bank. However, the inter-bank rate is usually higher than deposit rates, especially during a monetary squeeze. For example, the inter-bank rate soared to 200 per cent in August 1997, following a sharp contraction in the money base. As a comparison, deposit rates were only in the range of 25 per cent to 40 per cent during that time. Moreover, the interest rate charged for liquidity assistance from the central bank is at a penalty rate and thus, utilising such liquidity facility would worsen the financial position of the bank. This is the reason why banks with higher liquidity tended to perform better during the crisis.

Note that, on average, the liquidity position of solvent banks is twice that of the insolvents. In other words, the former were much more able to avoid the cost resulting from the lack of liquidity. Moreover, banks with a better liquidity position could benefit from the hike in the inter-bank rate.

As an alternative to LIQU, the two reserve ratios, RESR1 and RESR2 could be used to analyse the liquidity position of a bank. However, RESR1 and RESR2 for solvent and insolvent banks are very close. This may be the result of

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<sup>10</sup> Marshall (1994), however, finds that risks may be reflected in the deposit rates. Interestingly, she does not take into account the fact that most large banks may have low quality loan portfolios, owing to loans granted to affiliates with low interest rate.

the reserve requirement imposed by the authorities, where the reserve ratio has to be at least 5 per cent. Indeed, the value of RESR2 for both groups is close to the required reserve.

The coefficient on placements with other banks (BPLAC) is significant at the 10 per cent level with a negative sign. This implies that banks with higher BPLAC were more vulnerable to contagious bank failure. In other words, banks were exposed to a systemic crisis in the sense that the failure of one bank can induce the failure of others through the inter-bank market. This is quite surprising, because such placements have been fully guaranteed by the authorities since February 1997. Perhaps one explanation is that the Indonesian Banking Restructuring Agency (IBRA) faces difficulties in honouring inter-bank claims partly due to the slow progress in disposing IBRA's assets.

The coefficient attached to foreign exchange liabilities (FLIAB) is significant at the 5 per cent level with negative sign. In addition, the net open position (NOP) was not significant and, hence, was dropped from the equation. This suggests it was not currency mismatches that led to insolvency, but deterioration in the quality of loans denominated in foreign exchange, and the burden in foreign exchange liabilities. More specifically, banks were able to avoid direct exchange risk by passing this risk on to borrowers. Nevertheless, because the borrowers faced currency mismatch, the banks still faced such risk indirectly. As will be discussed in Chapter 9, there is strong evidence that domestic oriented activities such as property and inland transport sectors were exposed to currency risk.

The above inference is supported by the fact that the value of NOP for both groups of banks is very close, and insolvent banks tend to have much higher FASS and FLIAB. This suggests that currency depreciation affects banks through deterioration in the quality of loans denominated in foreign

currency. Given this problem, banks are at risk of paying liabilities denominated in foreign exchange. In other words, foreign exchange liabilities represent the bank's vulnerability to currency depreciation.

The variable STATUS, which indicates whether a bank has a foreign exchange licence or not, is statistically insignificant. This suggests it is not the status of the bank, but the extent of its foreign exchange liabilities that makes it vulnerable to currency shock.

The dummy of connected lending (DLLL) is the strongest explanatory variable, in the sense that it has the highest t-ratio. The coefficient carries a negative sign, supporting the hypothesis that most of the loans allocated to firms and/or persons connected to bank management and owners were low quality or risky. There are reasons for this to be the case. First, dubious and risky projects might not pass the loan screening process if they were proposed to other banks. Second, connected lending resulted in relatively concentrated loan portfolios, making banks highly vulnerable to the economic downturn. For instance, prudent banks would avoid high exposure to the property sector, although this sector was very lucrative during the boom period. Because of that, firms would have to go to their own bank to finance such investment. Third, banks were vulnerable to contagion resulting from the poor performance of firms within the group, because connected lending might not have been assessed carefully. Fourth, the risks were often not properly priced. It is well known that banks gave concessionary loans to their own group (Agung 1997).

The robust result for DLLL is not surprising given that most of the insolvent banks violated the legal lending limit. About 65 out of the 82 insolvent banks violated the limit. In contrast, only 13 out of the 58 solvent banks violated the limit. Moreover, the degree of connected lending amongst the solvent banks was much smaller, at only 22.6 per cent of total equity. On the other hand, for the insolvent banks, such lending was higher than total equity (104 per cent).

The coefficient on the variable C1 is significant at 20 per cent with a negative sign. Thus, there is weak statistical support for the hypothesis that

banks with a higher ownership concentration tend to have poorer performance. It was expected that a bank majority shareholder tends to be less prudent, in the sense that the owner can direct the bank to finance riskier activities. On the other hand when ownership is more diversified, other owners may prevent one of them from risking the bank.

The dummy variable CRONY is significant at 5 per cent level with the expected (negative) sign. Banks owned by cronies tended to perform poorer during the crisis. The reasons are, first, the authorities might have difficulty in disciplining crony banks, due to strong political intervention. Even if they violated serious prudential regulations, the authorities were not able to penalise or close these banks. For instance, Bank Pacific, owned by the Sutowo family, was insolvent before the crisis but the authorities kept it alive until November 1997. Second, and more importantly, these banks may have relied on implicit guarantees leading to excessive risk taking in the lead up to the crisis.

Amongst 22 crony banks, only two are solvent, namely Bank Muammalat and Bank Umum Tugu. One has been fully recapitalised by its owners, namely Bank Windu Kencana. Four banks have been taken over by the government, namely BCA, RSI bank, BUN, and Bank Duta. Another four were included in the recapitalisation program, namely Lippo Bank, BII, Bukopin, Bank Niaga, and Bank Universal. The rest, mostly small banks, have been liquidated.

The coefficient attached to the security holding (SECU) variable has the expected (negative) sign, but fails to achieve statistical significance even at the 20 per cent level. Thus, the result is at best inconclusive with regards to the impact of a fall in asset prices on bank performance. Securities held by banks consist of both safe and risky securities. The interest rates on SBIs -part of safe assets- increased during the crisis and may have partly offset the fall in price of risky assets, such as common stocks and private bonds. Thus, it is not surprising that SECU fails to achieve statistical significance.

The weighted elasticity will be used for comparing the relative importance across explanatory variables. In order to preserve conservatism, only variables that achieve two-sided 10 percent or one-sided 5 percent statistical significance

level are considered. Moreover, because DLLL and CRONY are dummy variables, they are not comparable to other variables. By comparing the weighted elasticities, the relative importance of the variables can be ordered as follows: ECAR, CREG, BPLAC, FLIAB, and LIQU.

Amongst prudential measures, capital adequacy (ECAR) is the most important but is also, perhaps, the most frequently violated. In August 1997, there were 50 banks that could not meet 5 per cent capital adequacy ratio (Djiwandono 2000). Moreover, as of June 1997, six banks remained technically insolvent and the authorities seemed unable to find sufficient reason to close these banks.

Loan growth is the second most important variable, suggesting a close association between high loan growth and poorer loan quality. Though the authorities had put an 18 percent limit on loan growth, most banks violated this limit. From 1995 to June 1997, loan growths of private banks was about 32 percent per annum. Even worse, the loans of 42 banks grew by more than 50 percent per annum, 11 of which grew by more than 100 percent.

Placement with other banks is the third important determinant, which suggests that the guarantee given to third party liabilities is not effective for preventing systemic risks. As mentioned, IBRA is particularly responsible for the very slow progress in honouring inter-bank claims. The slow release of such claims might have disrupted the cash flow of creditor banks.

Notably, the fourth important source of vulnerability is the level of foreign exchange liabilities. This is not surprising since the currency depreciated by about two thirds of its value between July 1997 and July 1999. The depreciation contributed to the burden of non-performing loans, especially those held by firms with currency mismatch. This implies that the net open position regulation is not effective in protecting banks from currency risks, unless foreign exchange liabilities are directed for financing export oriented activities.

The fifth factor is the liquidity ratio. The banks' cash flow might be interrupted due to increasing bad loans and, most importantly, panic runs on deposits. Therefore, liquidation of current assets could prevent the banks from collapsing. However, this does not suggest that banks should always maintain large excess reserves.<sup>11</sup> Rather, the balance between liquid assets and liabilities should be maintained more cautiously.

## **5.7. Conclusion and policy implications**

This chapter has examined the underlying problems that made Indonesia's banking sector vulnerable to the financial crisis, we conclude that the banking sector was indeed vulnerable. Some problems were associated with difficulties in the enforcement of prudential regulation. Others were as consequences of domestic financial liberalization. In addition, cronyism was a big problem.

Stricter prudential measures are obviously required to prevent excessive risk taking, especially during a boom period following a major banking deregulation. The increase in competition may lead to a substantial squeeze in profitability and, hence, a bank's ability to cover losses. A higher capital requirement may prevent banks from expanding loans excessively, which can drive the banks to risky activities. However, as argued by McLeod (1999), the problems were not due to the lack of tight regulations, but more due to the lack of willingness to adhere to them.

In sum, the findings suggest that forbearance of prudential regulation can incur high social costs. Thus, prompt corrective actions are required for preventing a similar crisis in future.

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<sup>11</sup> McLeod (1999) finds that banks always maintain excess reserves, suggesting that the violation of reserve requirements is not the issue.

# **Chapter 6**

## ***A Mundell-Fleming Version of Bernanke-Blinder Model***

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### **6.1. Introduction**

This chapter presents a macroeconomic model within which the interrelationship between the banking sector and the rest of the economy can be analysed. The model is an extension of the Bernanke-Blinder model (BBM) where banks are explicitly incorporated.<sup>1</sup> The adoption of the BBM was motivated by the need to incorporate the banking sector explicitly in a macroeconomic model, in order to have a better framework for the role of banks in a financial crisis. It truly reflects the credit view that the inclusion of banks as financial intermediaries opens up additional channels through which disturbances in financial markets affect commodity markets and vice versa. Thus, the model provides the transmission mechanisms of a shock in a certain macroeconomic variable, by which the role of the banking sector in the origin and propagation of the crisis can be analysed systematically. In other words, this chapter presents a theoretical foundation for the empirical analyses that will be carried out in Chapters 8 to 10.

There are two reasons to use a bank centred macroeconomic model in favour of the traditional IS-LM framework. First, banks are the main financial intermediaries in developing countries. Therefore, replacing the bank credit market with a bond market in a macroeconomic model seems unrealistic. It is widely accepted that bank loans are not a perfect substitute for bonds. Thus, the inclusion of banks in the model will suggest different implications regarding the way in which financial and commodity markets interact. Second, there is

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<sup>1</sup> The BBM was typically a closed economy macroeconomic model. The open economy version of the model was first introduced by Spiegel (1995). However, Spiegel failed to make the distinction between the concept of 'stock' and 'flow' of foreign debts and therefore the model was misspecified.

virtual consensus that weaknesses in the banking sector have contributed significantly to financial crises in East Asia as well as in other regions.<sup>2</sup> Under a fragile banking system, it would be difficult to stave off currency speculation by raising interest rate (Rajan and Sugema 2000 and 2001). A large increase in interest rate can worsen the already defunct banks through the increase in credit risk and moral hazard problems (Mishkin 1996 and Obstfeld and Rogoff 1995). Note that this aspect tends to be ignored in the conventional IS-LM approach. Third, the soundness or fragility of the banking sector should also be taken into account for analysing the propagation of the crisis. There is ample evidence that banking sector problems tend to worsen the economic situation in the wake of the currency crisis. The IS-LM framework ignores these three considerations and thus is likely to yield misleading inferences (Mankiw 2000).

The rest of this chapter is organised as follows. Section 6.2 presents the basic set-up of the model, and the rest of the chapter deals with the model's implications. Section 6.3 discusses the implication of financial liberalisation on capital flows and interest rates. Section 6.4 determines possible triggers of the crisis, and how to model them in the context of the current model. Section 6.5 raises the issues of policy dilemma brought about by a weak banking sector at the onset of the crisis. Section 6.6 provides the 'credit transmission' of the propagation of the crisis.

## ***6.2. Basic set-up of the model***

The model draws on Bernanke and Blinder (1988) and Spiegel (1995) which explicitly incorporates the banking sector into the standard Keynesian IS-LM framework. By relaxing the assumption that bonds and loans are perfect substitutes, Bernanke-Blinder model (BBM) replaces the usual IS curve with the CC curve, which denotes a simultaneous market clearing condition for commodities and credit markets. Moreover the LM (Liquidity-Money) curve is

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<sup>2</sup> See for example Goldstein (1998), among others.



modified so that money demand is determined by deposits. The set up for the BP (Balance of Payments) curve is the same as in the Mundell-Fleming model.

The model is characterised by five types of agents: households, firms, banks, the government and foreigners. There are three domestic financial assets, namely: currency (cash or reserves) ( $R$ ), bank deposit ( $D$ ), and bond ( $B$ ). Agents can hold three financial assets, namely currency, bank deposits, and bonds. Demand for those assets depends on interest rates and income. Demand for currency is positively dependent on income, but negatively dependent on interest rates on bank deposits and bonds. Demand for bank deposits is positively affected by interest rates on deposits, while the interest rate on bonds has a negative impact. The impact of interest rates on household demand for bonds is the reverse of that on the demand for bank deposits.

Bank deposits and bonds are assumed to be imperfect substitutes from the households' point of view. Imperfect substitution can arise because of information asymmetry, as widely discussed in the credit market literature. Households, having incomplete information about firms, face adverse selection problems, and hence spread their financial asset holdings between bonds and bank deposits, rather than solely relying on the former.

Firms are assumed to produce uniform output and sell output in a perfectly competitive market. Physical capital is financed by issuing bonds and obtaining loans. Firms' demand for bank loans is positively affected by the interest rate on bonds, and negatively by the interest rate on loans. Meanwhile, the supply of bonds is inversely related to the interest on bonds and positively related to the interest rate on loans.

An individual bank has three types of liabilities: deposits, borrowings from the central bank, borrowings from foreign banks, and borrowings from other domestic banks through a domestic inter-bank market. Borrowing from the central bank and from the inter-bank market occurs if the bank lacks liquidity. Banks have an inherent liquidity mismatch, because they lend in the longer term while acquiring third party funds in the relatively short term. Borrowing from the central bank is possible, since it functions as a lender of

the last resort. Though they matter for an individual bank, inter-bank borrowings sum to zero in aggregate and, hence, do not affect the quantity of third party funds held in the whole banking system. However, they do have an impact on the cost and income structure of individual banks, affecting lending and deposit rates of interest. On the assets side, banks have loans, bonds, and reserves. Loan supply and demand for bonds depend on the interest rates for both loans and bonds.

Government comprises two distinct entities, namely a fiscal authority (central government) and a monetary authority (central bank). For the sake of simplicity, it is assumed that the central government always keeps the budget strictly in balance; i.e. tax revenue is always equal to government spending. This means that a change in the budget has no impact on monetary aggregates. This assumption is necessary in order to focus on the interaction between the central bank and the rest of the economy. The central bank acts as a lender of the last resort for banks and holds two assets, namely foreign reserves and liquidity credits to banks. On the liability side, it has currency issued to banks and households.

The economy is connected with the rest of the world through the balance of payments, which has three components: capital account, current account, and the change in foreign reserves. The current account has two components: the trade balance, which is determined by income and the real exchange rate, and interest payments on foreign borrowing.<sup>3</sup> The capital account balance is determined by the foreign-domestic interest rate differentials, expected depreciation of the exchange rate, and risk premium.

Since the main purpose of this study is to analyse the Indonesian twin crises, it is necessary to adopt the “credit view” as the basis for the analytical framework.<sup>4</sup> The original BBM is modified in four aspects.

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<sup>3</sup>Trade balance here is defined to cover both balances in goods and services in the BOP accounting. Net transfers are assumed to be zero.

<sup>4</sup> The credit view here is defined as a modeling approach that consider bank lending transmission mechanisms that affect economic performance.

First, the balance of payments is modelled in terms of two behavioural equations, trade balance and capital inflow equations and one identity, that is, the balance of payments identity. In Spiegel's (1995) formulation, the distinction between net capital inflow and cumulative foreign capital stock is not made. Consequently, his model is mis-specified. In the current model, net capital inflow (capital account balance) is a function of interest rate differentials corrected for expected depreciation and risk premium. This net inflow is then added to the last period stock of foreign capital to form the current foreign capital stock, which also measures the country's foreign indebtedness. With these modifications, our model is an open economy version of BBM.

Second, the money demand is determined by two forces: the need of households to hold cash and the size of bank liabilities, as banks are required to hold reserves as a fraction of third party liabilities. Domestic deposits and foreign debt determine the size of bank reserves. Therefore, money demand is driven by both domestic and foreign interest rates, and reserve requirements.

Third, a bank bail out function is introduced in order to capture monetary consequences of worsening banking condition. Borrowing from the central bank is one of the determinants of money supply (Mishkin 2000). This is indeed one of the main contributions to the modelling of the macroeconomics of banking.

Fourth, the feedback effects from the supply side of the economy are channelled through the change in equilibrium in commodity and credit market. This is done because the current model is demand-sided, a typical characteristic of the Keynesian approach. However, it will be clear later that a supply side shock can be easily captured by the model within the current set up. The purpose is to keep the model tidy without ignoring the importance of the supply side.

### 6.2.1. Goods market

Domestic absorption ( $A_t$ ) consists of consumption ( $C_t$ ) and investment ( $I_t$ ). Consumption is defined as a function of income ( $Y_t$ ), the real exchange rate ( $e_t$ ) measured as the nominal exchange rate times foreign price divided by domestic price, and interest rates on deposit ( $r_t^D$ ) and bond ( $r_t^B$ ):

$$(6.1) \quad C_t = C(\underset{+}{r_t^B}, \underset{+}{r_t^D}, \underset{\pm}{e_t}, \underset{+}{Y_t})$$

Note that the signs + and – under the equation are the postulated signs of the partial derivatives. It is a convention to assume that the marginal propensity to consume is less than unity. The effect of real exchange rate on consumption can be either positive or negative. Because a real depreciation increases prices of consumption goods, it reduces real income and therefore has a negative effect on consumption (income effect). However, it can also increase the demand for domestic goods as prices of domestic goods become lower relative to imported goods (expenditure switching effect). Thus the net effect is ambiguous; depends on the relative magnitude of the expenditure switching and income effects.

Investment is a function of interest rates and real exchange rate:

$$(6.2) \quad I_t = I(\underset{-}{r_t^B}, \underset{-}{r_t^L}, \underset{\pm}{e_t})$$

where  $r_t^B$  is bond interest rate and  $r_t^L$  is the lending rate. Investment will decline when lending and bond rates increase, because the cost of hiring external funds increases. As in the case of consumption, the effect of a real depreciation on investment is ambiguous. However, firms usually have foreign debts and therefore a depreciation increase the burden of such debts in terms of domestic currency. Because of that, the negative impacts on investment may be more pronounced than that on consumption.

By combining consumption and investment, we will have domestic absorption  $A_t$ , can be simply written as:

$$(6.3) \quad A_t = C + I = A(\underset{-}{r_t^L}, \underset{-}{r_t^B}, \underset{\pm}{e_t}, \underset{+}{Y_t})$$

In the goods market, the domestic economy is linked with the rest of the world through trade. A net export function or the trade balance is introduced to capture this link:

$$(6.4) \quad T_t = T(e_t, Y_t)$$

+       -

Holding foreign countries' income constant, the trade balance is a function of the real exchange rate and domestic income. A real devaluation will improve trade through a reduction in import and increase in export.

Aggregate demand is the sum of domestic absorption and trade balance. Aggregate supply is equal to total output. Equating supply and demand yields:

$$(6.5) \quad Y_t = A_t + T_t$$

Total differentiation of (6.5) yields the usual IS curve in equation (6.6):

$$(6.6) \quad \left[ \frac{dY_t}{dr^B} \right]_{IS} = \frac{A_{r^B}}{1 - A_y - T_y} < 0$$

Note that the numerator is obviously negative and the denominator is positive. Thus the IS curve is downward sloped in the  $Y - r^B$  space.

### 6.2.2. Deposit and Loan Market

In order to make the model more tractable, it is usually assumed that banks will always accept deposit as much as the customers want. Thus the amount of deposit will be determined solely by factors affecting the demand for deposit. The demand for deposit is defined as a function of deposit and bond rates:

$$(6.7) \quad D_t = \varphi^D(r_t^D, r_t^B)$$

+       -

where  $r_t^D$  is the deposit rate. Because bond is a substitute for deposit, increases in the bond rate tend to lessen the willingness to hold deposit. Thus deposit is inversely affected by the bond rate.

Assume that banks are required to hold reserves as a fraction of deposit.

If  $\tau$  is the reserve requirement, the total reserve held by the banks is equal to:

$$(6.8) \quad R_t^b = \tau D_t$$

Thus the total funds ( $BF_t$ ) available for bank loans ( $L_t^s$ ) and bonds ( $B_t^b$ ) is:

$$(6.9) \quad BF_t = (1 - \tau)D_t = L_t^s + B_t^b$$

Let  $\lambda$  be the share of funds allocated for loans, which is a function of interest rate on both loans and bonds. The supply of loans and banks' demand for bonds is therefore:

$$(6.10) \quad L_t^s = \lambda(r_t^L, r_t^B)(1 - \tau)D_t; \text{ and}$$

$$(6.11) \quad B_t^b = [1 - \lambda(r_t^L, r_t^B)](1 - \tau)D_t$$

The demand for loans is defined as follow:

$$(6.12) \quad L_t^D = L^D(r_t^L, r_t^B, Y_t)$$

Output is included as an explanatory variable to capture the demand for transaction balances and operating capital, which are likely to be correlated with current output. The loan market will clear when  $L^D = L^S$ . Hence the market equilibrium is given by:

$$(6.13) \quad L^D(r_t^L, r_t^B, Y_t) = \lambda(r_t^L, r_t^B)(1 - \tau)D_t$$

The right hand side of equation (6.13) states the supply of bank loan, which also depends on bank deposits. Thus the equation states the equilibrium condition between loan and deposit market simultaneously. Because of that (6.13) may be called as *CD* curve or credit-deposit curve. Next, we need to know the shape of the *CD* curve in the  $Y - r^B$  space. A total differentiation on (6.13) will yield:

$$(6.14) \quad \left[ \frac{dY_t}{dr^B} \right]_{CD} = \frac{(\lambda_{r^B} \varphi^D + \lambda \varphi_{r^B}^D)(1 - \tau) - L_{r^D}^D}{L_Y^D} < 0$$

That is the *CD* curve is downward sloped in the  $Y - r^B$  space.

### 6.2.3. The CC curve

A credit-commodity (CC) curve summarises equilibrium conditions both in the goods and loan-deposit markets. It is a combination between the IS and CD curves. Since both IS and CD curves are downward slopped in the  $Y - r^B$  space, the CC curve must also downward slopped.

In order to integrate the two curves, we must rearrange equation (6.13) as:

$$(6.13a) \quad r_t^L = \phi(r_t^B, r_t^D, Y_t, \tau, \lambda, D_t, L_t^D)$$

where  $\phi_{r^B} > 0$ ,  $\phi_Y > 0$ ,  $\phi_{r^D} > 0$ ,  $\phi_\tau > 0$ . Combining equation (6.13a) and (6.5) gives the so-called CC equation:

$$(6.15) \quad Y_t = A(r_t^B, \phi(r_t^B, Y_t, r_t^D, \tau, \lambda, D_t, L_t^D), Y_t, e_t) + T(e_t, Y_t)$$

It is easy to see that the CC curve is negatively sloped in  $Y - r^B$  space like the IS curve:

$$(6.16) \quad \left( \frac{dY_t}{dr_t^B} \right)_{CC} = \frac{A_{r^B} + A_{r^L} \phi_{r^B}}{1 - (A_{r^L} \phi_Y + A_Y + T_Y)} < 0$$

However, unlike the IS curve, it is also shifted by monetary policy ( $\tau$ ) and by credit-market shocks that affect either  $L^D(.)$  and  $\lambda(.)$ . Moreover, the impact of a real exchange rate depreciation is ambiguous. If it is expansionary, the CC curve shifts rightward. Conversely, a leftward shift indicates that the impact is contractionary.

### 6.2.4. Money market and the LM curve

The money market is described by a rather unconventional LM curve. In the Bernanke-Blinder model, the money supply is formulated in the context of money multiplier. However, this seems to be inadequate since it ignores the role of 'cash' held outside the banking system and the importance of lender of the last resort function in the money supply process. Because of that, the specification of the LM curve adopted here somewhat departs from the conventional one.

Second, the supply of money is affected by central bank's function as a lender of the last resort for troubled commercial banks. It is a customary that in the traditional money supply modelling the effects of such function is ignored. However, in an adverse situation where many banks face liquidity problem, the money supply could not be fully controlled by the central bank. Moreover, explicitly modelling of the last resort function is not only important for understanding the money supply process, but also for indirectly measuring the overall fitness of the banking sector.

$$(6.17) \quad R^h = \varphi^R(r_t^B, r_t^D, Y_t)$$

<sup>6</sup> See Calvo and Vegh (1990) who develop the microfoundation of a broadly similar household setup (with three financial assets), assuming the existence of a liquidity in advance constraint.



money. Holding money means that households sacrifice the opportunity to earn interest payment from other assets. As interest rates increase, the opportunity cost of holding money rises, the demand for money falls.

Combining (6.17) with (6.8) yields the total demand for money:

$$(6.18) \quad RD_t = \varphi^R(r_t^B, r_t^D, Y_t) + \tau D_t$$

That is the demand for money is the sum of household demand for currency and bank demand for reserve.

The government monopolises the supply of money and it is sometime more convenient to assume that the central bank has complete control over the money supply. However, the central bank may not be able to fully control some fraction of it. For instance, in a fixed exchange rate regime the monetary base does depend on the balance of payment, unless the central bank can fully sterilise the movement in the net foreign assets (NFA). The other example would be the case when the central bank acts as a lender of the last resort. In this case, holding other things constant, an increase of banks' borrowing from the central bank will eventually increase the money supply.

In the current model, the money supply is driven by three forces: net foreign assets (NFA), bank bail out (BO), and other net assets (NOA). The usual disaggregation of money supply is net domestic assets (NDA) and net foreign assets. Thus, NDA is broken down into two components BO and NOA. More formally the money supply is formulated as:

$$(6.19) \quad RS_t = NFA_t + BO_t + NOA_t$$

The treatment of NFA is relatively standard in that the balance of payments is treated as a money supply shifter, *ceteris paribus*. As usual, a complete sterilisation means that the change in NFA is counter-balanced by the change in NOA in opposite direction, making the money supply constant.

NOA mainly comprises net claims on the central government (fiscal authority) and on non-bank private entities. It was assumed that the fiscal authority always keep the budget in balance and hence the amount of net

claims on the central government is zero. In order to make the discussion simpler, it is assumed that the amount of net claims on non-bank private entities is fully determined by the central bank's own discretion. In other words, the level of NOA is determined exogenously.

The third component, *BO*, is meant to capture the effect of bank soundness (weaknesses) on money supply. *BO* is defined as commercial banks' borrowing from the central bank. As a lender of the last resort, the central bank may provide "liquidity assistance" to distressed banks. In general, the help is given to illiquid but solvent banks.

The demand for central bank assistance by the banking system is inversely correlated with bank soundness. Thus it is necessary to identify factors affecting bank soundness. In Chapter 5, we have discussed the relevant factors from micro-managerial perspective. Aside from that, macroeconomic variable can also affects bank soundness (Hardy and Pazarbasioglu, 1998 and Gonzalez-Hermosillo, 1999). To complement the previous work in Chapter 5, we may now concentrate on macroeconomic aspects affecting bank performance.

Focusing on the relationship between bank soundness and monetary movement, three macroeconomic variables are considered. It is postulated that banking fragility is contemporaneously associated with falling GDP, increasing real interest rate, and deteriorating real exchange rate. The reasons are as follows.

Economic downturn often results in heightening banking problems.<sup>7</sup> Facing a lower aggregate demand, firms may have to lower production and increase stocks, which affect both cost structure and cashflow. Lower demand can also mean lower price levels, which together with higher cost depresses financial position of firms. This in turn can result in a higher level of non-performing loans, interrupting banks' cash flow.

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<sup>7</sup> The effect of economic downturn on bank soundness is particularly well known. The saving on loan crisis of the 80's was triggered by the collapse in the real estate industry (FDIC 1997).

Increases in the real interest rate can affect bank soundness through two channels. First, as the cost of external capital increases, some firms with low return may not be able to fully service bank loans. Second, moral hazard problem may heighten, increasing the probability of loan default (Stiglitz and Weiss, 1981).

Exchange rate depreciation impacts on the banking sector through three channels. First, if banks have currency mismatches, the increasing burden of liabilities dominated in foreign currency can lead to financial losses. Second, even if they can pass the currency risk to the borrowers, they may be exposed to the risk indirectly through deterioration of loan quality. Firms with earnings mainly denominated in domestic currency but obtain loans denominated in foreign currency may become insolvent. Third, given that depreciation adversely affects firms, moral hazard problems can heighten credit risks (Mishkin 1996).

Given that the central bank stand ready to help them out, the demand for bank bail out can be formulated as follows:

$$(6.20) \quad BO_t = B(Y_t, r_t^L, e_t)$$

That is, a decline in output, an increase in lending rate, and a real depreciation are likely to produce adverse effects on the banking sector, and therefore increase in the demand for bailout. Combining (6.19) and (6.20), the money supply can be written as:

$$(6.21) \quad RS_t = NFA_t + B(Y_t, r_t^L, e_t) + NOA_t$$

The equilibrium condition in the money market is determined by the supply of and demand for money. Equating the supply and demand yields:

$$(6.22) \quad NFA_t + B(Y_t, r_t^L, e_t) + NOA_t = \varphi^h(Y_t, r_t^D, r_t^B) + \pi D$$

---

Rozas-Suarez and Weisbord (1995) also find that banking problems worsened due to deterioration in economic condition for Columbian case.

Equation (6.22) represents an LM curve and the slope of the curve can be checked by differentiating it with respect to  $Y$  and  $r^B$ :

$$(6.23) \left( \frac{dY_t}{dr_t^B} \right)_{LM} = - \frac{\phi_{r^B}^h + \pi D_{r^B} - B_{r^L} \phi_{r^B}}{\phi_Y^R + \pi D_Y^h - B_Y} > 0$$

In other words, the LM curve is upward sloped in  $Y - r^B$  space.

It should be stressed at the outset that the inclusion of the bank bailout function does not necessarily imply a fully endogenous money supply. This is because the central bank still has two discretionary components of the money supply, notably  $NFA$  and  $NOA$ .<sup>8</sup> In order to fix the money supply, an increase in  $BO$  can be offset by reducing  $NOA$  by the same amount.

However, in some cases where  $BO$  becomes very sensitive to the interest rate, the monetary authority is facing an impossible task: because the central bank stands ready to provide bail out money, a monetary austerity policy will be immediately reversed as non-performing loans increase significantly.<sup>9</sup> For instance, if  $B_{r^L} \approx \infty$  or  $BO$  is almost perfectly sensitive to the change in interest rate, the LM curve becomes horizontal. In such a case, the money supply will be fully endogenous and neither money supply nor interest rate can be a target of monetary policy. In other words, monetary targeting loses its credibility.

### 6.2.5. Balance of Payments and the BP Curve

The balance of payment has two components: current and capital accounts. The current account balance is simply defined as the sum of trade balance and interest payments:

$$(6.24) \quad CA_t = T_t + r_t^* K_t^*.$$

<sup>8</sup> Under a peg regime,  $NFA$  affects money supply unless it is counterbalanced by  $NOA$ , implying that  $NOA$  is the only discretionary component.

<sup>9</sup> Special thanks to an anonymous examiner for pointing out this.

Where  $K_t^*$  is total stock of foreign capital invested in the domestic economy and  $r_t^*$  = international interest rates (money market).<sup>10</sup>

Capital inflows are dictated by interest differentials, and may therefore be written as:

$$(6.25) \quad K_t^* - K_{t-1}^* = \Delta K_t^* = k(r_t^B - r_t^* - \rho_t - \pi_{t+1}^e)$$

where:  $\rho_t$  = country risk premium; and  $\pi_{t+1}^e$  = expected exchange rate depreciation (assumed zero henceforth, given the assumption of a credible fixed exchange rate, pre-crisis). Let  $\alpha_t = r_t^B - r_t^* - \rho_t - \pi_{t+1}^e$ . As usual, assume that  $k_\alpha > 0$ , i.e. capital inflow is an increasing function of the spread between domestic and foreign interest rates. Note, the supply curve is assumed not to be perfectly elastic ( $k_\alpha$  is not infinite).

Current account deficit has to be financed through capital inflow and/or a reduction in the level of reserves. The balance of payments is defined by:

$$(6.26) \quad T_t - r_t^* K_t^* + \Delta K_t^* = \Delta R_t^* = BP$$

That is, the current account balance plus capital inflow must equal the change in reserves ( $\Delta R_t^*$ ). It is customary to set the balance of payments equilibrium to zero. Combining equations (6.24), (6.25) and (6.26), a balance of payments equation is obtained:

$$(6.27) \quad T(Y_t, e_t) = r_t^* K_t^* - k(\alpha_t)$$

As in the Mundell-Fleming model, this equation characterises the balance of payments. A capital inflow will finance a current account deficit and international reserves change in line with net capital inflow over and above the current account deficit.

Equation (6.27) is called a BP curve and differentiating it with respect to  $Y$  and  $r^B$  yields:

$$(6.28) \quad \left( \frac{dY_t}{dr_t^B} \right)_{BP} = - \frac{(1 - r_t^*) k_\alpha}{T_Y} > 0$$

---

<sup>10</sup> Spiegel treats foreign capital stock as net capital inflow

In other words, the BP curve is positively sloped in  $r^B - Y$  space.

### 6.2.6. Graphical Illustration

Now that we have derived the CC, LM and BP curve, and they can be put together in one diagram (Figure 6.1.) to produce a model that enable us to determine both output and the interest rate. Two points should be noted. First, the variable on the vertical axis is the bond market interest rate. Second is the maintained assumption that  $(dr_t^B / dY_t)_{LM} > (dr_t^B / dY_t)_{BP}$ .

The overall equilibrium is the intersection of the CC, LM and BP curves ( $E_0$ ). The equilibrium output is  $Y_0$  with the corresponding domestic interest rate at  $r^B_0$ . At that point the aggregate output equals aggregate demand (CC), quantity of money demanded equals the money supply and the balance of payments equals zero. At any other point in the diagram, at least one of these equilibrium conditions is not satisfied, and market forces move the economy toward the equilibrium, point  $E_0$ .

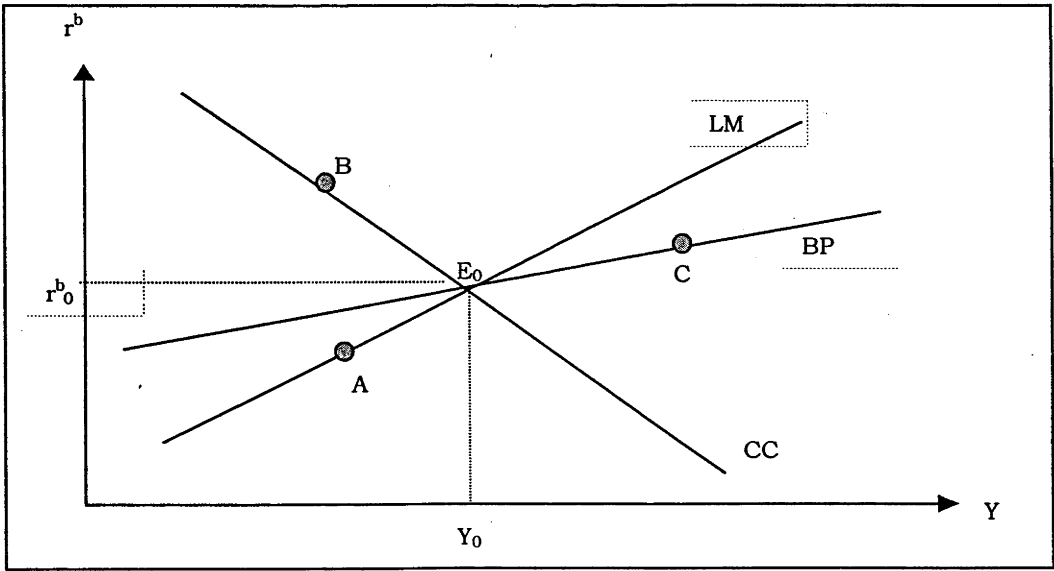
Let us consider the case where the economy is not at the general equilibrium, say at point A, which is on the LM curve but not on the CC and BP curves. At that point, the cost of external capital is below the equilibrium level, leading to higher demand for bank loans (for financing higher production levels). The supply of loans can only increase if interest rate increases. Moreover, because it bellows the BP curve, low domestic interest rate can induce capital outflow, which has to be financed by a trade surplus. Because of that, the economy moves up along the LM curve, leading to higher interest rate and output levels ( $E_0$ ).

If the economy is on the CC curve but off the LM and BP curves at point B, it will also head toward the equilibrium at point  $E_0$ . At point B, even though the commodity and credit markets are at the equilibrium, but the interest rate is too high. Because of that households will be willing to buy more bonds and

put more deposits in banks. This eventually will decrease domestic interest rates and induce more spending. In other words, the economy moves along the CC curve towards point  $E_0$ .

Another example would be the case where the economy is on the BP curve but off the LM and CC curve. At point C, the balance of payments equals to zero, but the output level is higher than it should be. From households' point of view, a higher output requires a higher transaction demand for money. Compared to the interest rate suggested by the LM curve, the interest rate at point C is lower than it should be, suggesting an excess demand for money. However, with a higher output level, the CC curve suggests that commodity and credit market will only clear at a lower interest rate. Thus point C suggest an excess supply of goods and excess demand for loans. Firms are unable to sell all their output, and unplanned inventory accumulates, prompting them to cut production and lower output. The decline in output means that the demand for money will also fall (closing the excess demand for money). Finally, the economy has to move to  $E_0$ .

**Figure 6.1.** Overall equilibrium



The remainders of this chapter make use of the model to examine a number of policy experiments and exogenous shocks. It will be shown that the model is able to highlights several possible causes and the transmission mechanisms involved in the propagation of a financial crisis.

### ***6.3. Triggers of the crisis***

In this section, it will be shown that the model is capable of accommodating commonly posited hypotheses regarding the sources of a financial crisis. The key to understanding these problems is indeed the shift in the balance of payments equation. In other words, any factor that can result in a deterioration of the balance of payments could be a good candidate for a trigger.

It is useful to distinguish external and internal factors leading a currency crisis. Internal factors include a weakening of the banking sector (Mishkin 1996, Rajan and Sugema 1999), monetization of budget deficit (Krugman 1979), a bust following a boom in investments or an assets market crash (Kindleberger 1976, Mishkin 1996, Krugman 1998), and crony capitalism (Krugman 1998). External factors include a rise in developed countries' interest rates (Eichengreen 1999, McKibbin 1998), an increase in perceived risks or uncertainty (Mishkin 1996, McKibbin and Martin 1998), an abrupt slowdown in exports (Bank of Thailand 1998, Rajan, 1999), and a liquidity squeeze by international creditors due to panic (Radelet and Sachs 1998, Chang and Velasco, 1998). The remainder of this section briefly discusses some of these factors.

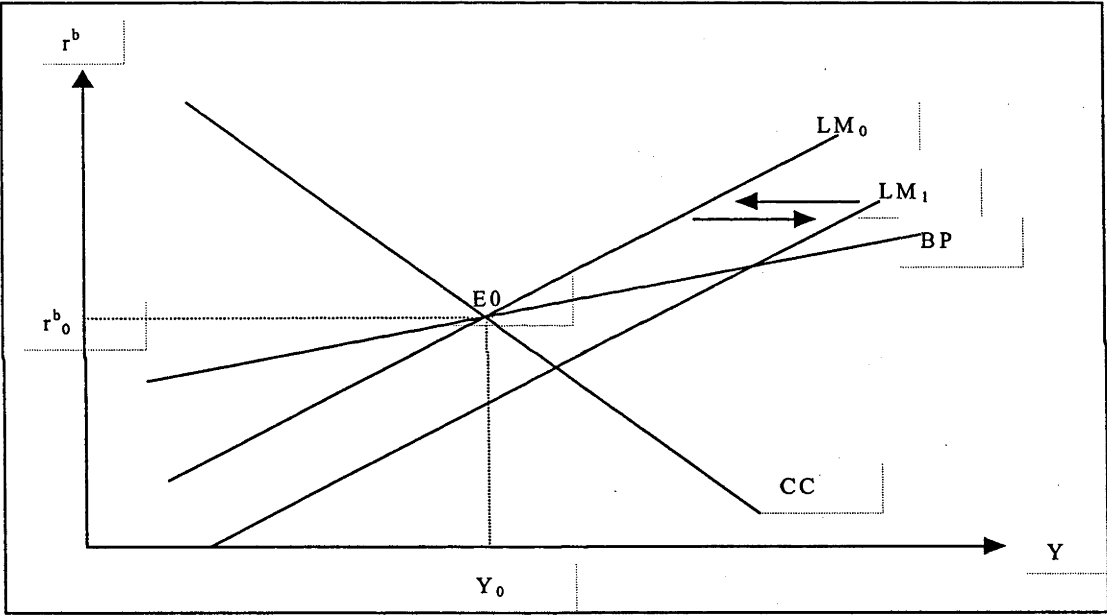
#### ***6.3.1. Monetisation of fiscal deficits***

Suppose that the central government constantly opts a budget deficit policy and does not have any means to meet the deficits except borrowing from the central bank. At the same time, a peg exchange rate regime has to be maintained. A monetisation of budget deficits means an increase in net other assets (NOA),



one of the components in the money supply. Holding other things constant, this will cause the LM curve to shift right ( $LM_0$  to  $LM_1$ , see Figure 6.2). This is not consistent with the peg regime, and therefore monetary expansion will have to be sterilised by selling foreign exchange reserves (i.e. the increase in NOA is counter balanced by a reduction in NFA by the same amount as suggested by equation (6.21)). As a result, the LM curve shifts back to  $LM_0$  and the level of reserve decreases. If this is done continuously, ultimately monetary expansions cannot be supported by the reserves and subsequently the currency has to be floated.

**Figure 6.2.** *Monetisation of fiscal deficit*



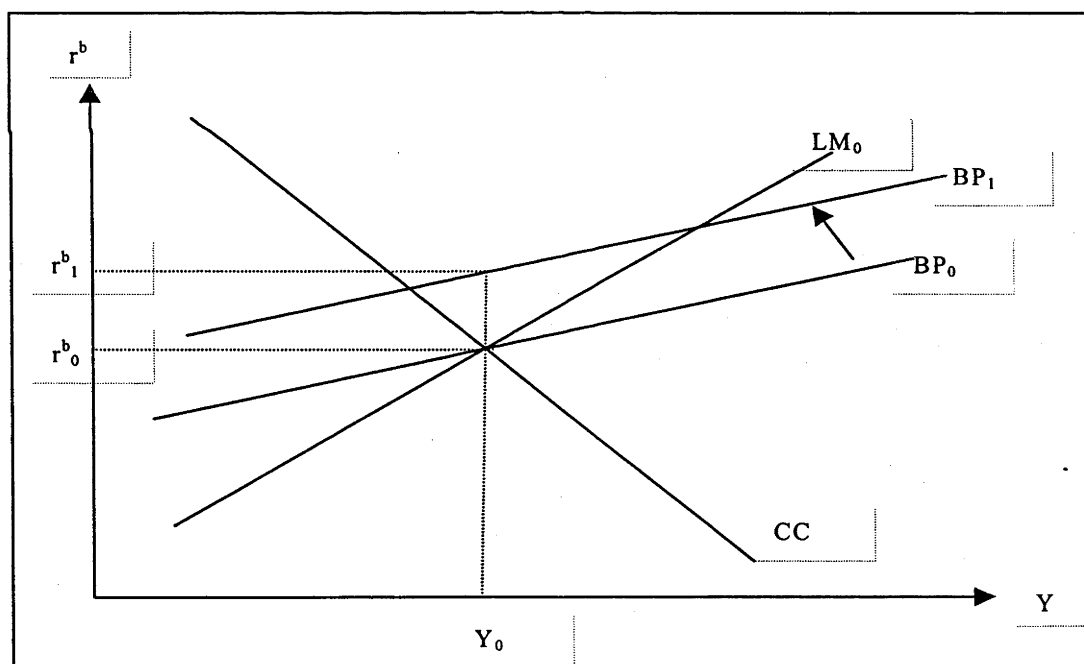
This idea can be extended, as in Dooley (1997) and Krugman (1998). If banks are guaranteed by the government, loan expansion financed by offshore funds will result in an increase in the implicit fiscal burden. When capital inflows reverse, or when firms borrowing from banks default, the banks' liabilities become the government's. Faced with this burden, the government may monetise a bank bail out. Similar mechanisms also apply to a case when cronies are implicitly guaranteed, as in Krugman (1997) and Corsetti *et.al.* (1998).

### 6.3.2. Rise in foreign interest rate

McKibbin (1998) and Eichengreen (1999) have emphasised that increases in developed countries' interest rates triggered a reversal of capital inflows in the East Asian region. While McKibbin pointed to the rise of US interest rates in late March 1997, Eichengreen stressed the increase in short-term interest rates in Japan in the northern spring of 1997.

The effect of increasing international interest rates is translated as an upward shift of the BP curve ( $BP_0$  to  $BP_1$ , see Figure 6.3). This triggers capital outflows, which eventually reduce reserve money. Hence, both the LM and CC curves shift leftward, leading to both a higher interest rate and lower output.

**Figure 6.3.** A rise in foreign interest rate



### **6.3.3. Increase in uncertainty**

Due to asymmetric information, foreign creditors may not be aware of the domestic financial problems (Hermalin and Rose, 1999). Domestic firms and banks that were eager to borrow abroad may have been those which were taking greater risks or financing poorer projects. This is consistent with the view asserted by the World Bank (1997, 1998) that capital inflows to the region tended to intensify for several years prior to the crisis, despite strong indications of increased financial fragility. Moreover, Hermalin and Rose (1999) propose two additional sources of risk in cross-border borrowing that are absent in a purely domestic context: the risk that sovereign borrowers will default, and the risk of macroeconomic instability that stems from the impact of net capital flows on the monetary system.

Assuming that foreign lenders were not fully aware of these problems, capital inflows can easily turn from bullish to bearish. New information that leads creditors to reassess risk can trigger capital outflows and currency crisis. As noted by Burnside *et.al.* (1998), the collapse of the Thai financial system may have led creditors to suspect similar problems existed in other economies in the region. Facing this possibility, they would have sought a higher risk premium and/or suddenly withdrawn their funds from these countries. In this model, the effect an increase in risk premium is similar to that of an increase in international interest rates (see Figure 6.3).

## **6.4. Policy responses to a speculative attack**

Whatever the reason for speculative attacks, a government is faced with difficult choices. The likely government response would be to increase interest rates, sterilising market intervention, or immediately float the currency. Each of these alternatives will be examined.

### 6.4.1. Interest rate hike

In order to fend off a speculative attack, the government has to engineer an increase in domestic interest rates, especially short-term rates.<sup>11</sup> There are two channels through which the balance of payments is affected. First, capital outflow can be prevented, as an increase in interest rates can offset the increase in expected depreciation. Second, the increase in interest rates reduces domestic absorption, thereby improving the current account balance.

The hike can be engineered by reducing the money supply, altering the LM curve. The impact of this policy option can be captured as a leftward shift in the LM curve (see Figure 6.4). It is clear from (6.22) that  $\left[ \frac{dY_t}{dRS_t} \right]_{LM} > 0$ , suggesting a lower equilibrium income for lower money supply. Through its impact on banks' reserve, a reduction in money supply affect adversely the loan supply. The final outcome would be a lower output level but with a higher interest rate.

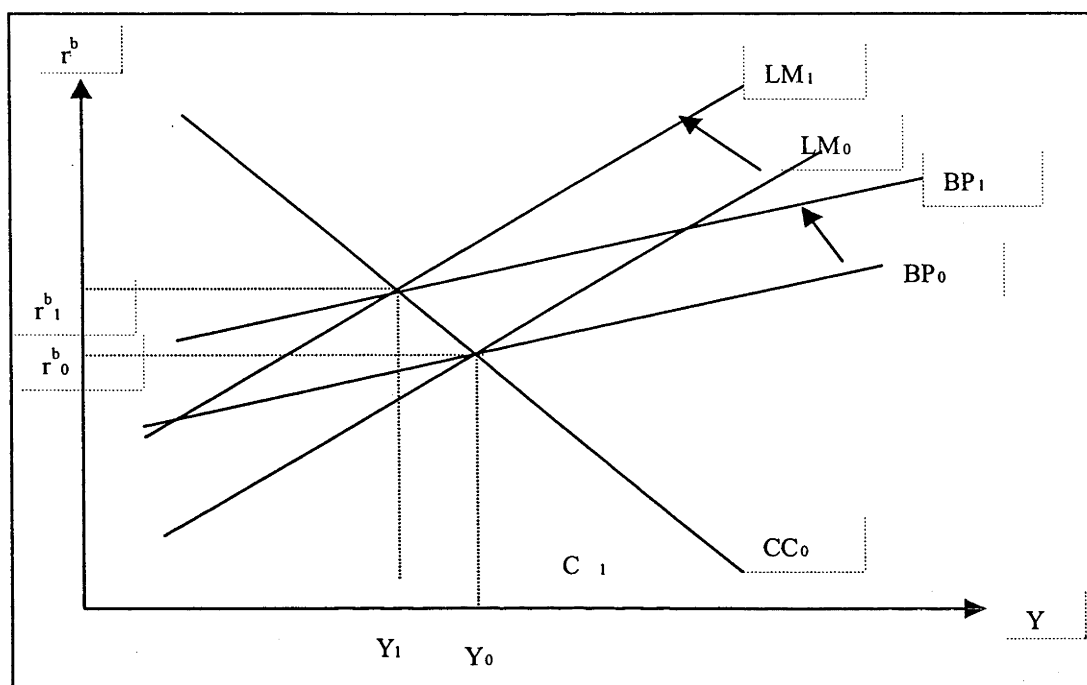
Under the conventional IS-LM framework, the impact is quite similar though not exactly the same. The LM curve shifts leftward and the final equilibrium would be a higher interest rate but lower output. Compared to the CC-LM approach, the IS-LM framework is lack of banking channel of monetary austerity. Thus, it tends to discount the severity of the impact. Indeed, this is one of the reasons why the CC-LM approach is used in this study.

It is worth to highlight that banking consideration is important, not only for identifying the impacts but also for assessing whether monetary tightening will be effective and credible. Some authors have raised the issue as follows.

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<sup>11</sup> Under a fixed exchange rate regime without bank bail out, capital outflows would naturally induce higher domestic interest rates. However, in a bank centred macroeconomic model, the impact of capital outflow on interest rates is ambiguous. Therefore, deterring speculative attack would require an interest rate increase.

**Figure 6.4.** *The impact of an interest rate hike*



Due to its adverse impact on the economy this strategy may not be effective in preventing capital outflows. Obstfeld and Rogoff (1995, p.81) summarise the possible calamity resulting from an interest rate hike as follows:

Such sharp spikes in interest rates, if sustained for any length of time, can wreak havoc with the banking system, which typically borrows short and lends long. Over the longer term, these unanticipated interest rate rises can also have profound negative effects on investment, unemployment, the government budget deficit and domestic distribution of income. A government pledge that it will ignore such side effects indefinitely to defend the exchange rate is not likely to be credible. Lack of credibility, in turn, makes a fixed exchange rate more vulnerable to speculative attacks.

They give an example of an interest rate hike that was not effective. On September 16, 1992, in an attempt to stave off a massive speculative attack on the Swedish krona, the Riksbank (Swedish central bank) increased the overnight interest rate to 500 percent for four days. Eventually, the Riksbank succeeded in defending the currency and brought down the interest rate within

a few weeks. However, this led to a weaker banking sector that was less able to withstand the next attack. Due to this shaky position, when the attack later revived the Riskbank was unable to increase interest rates, even above 20 percent, and consequently, on November 19 the peg had to be abandoned.

Others like Rajan and Sugema (2000 and 2001) identify the conditions under which an interest rate hike would (not) be credible. They argue that there are three states of the banking system that can give rise to differences in the likely outcomes. First, if the banking sector is "near collapse" the peg will have no credibility, therefore the currency will be fully floated, regardless of whether or not it is being attacked. In this circumstance, a balance of payments crisis is a natural consequence of a banking crisis and interest rate policy would not be effective at all.

Second, if the banking sector is "rock solid", the government has a degree of freedom to increase interest rates. By engineering a recession, through a reduction in domestic absorption, the balance of payments can be sustained. It follows that the peg need not collapse. In the current model this is equivalent with saying that  $\frac{dBO_t}{dr_t^L} \approx 0$  and  $\frac{dL_t^S}{dr_t^L} \approx 0$ . That is the banking sector and the credit market is relatively unaffected by interest rate. This also means that the current model collapses to the traditional IS-LM model (i.e. banking channels are not relevant).

Third, if the banking sector is neither "rock solid", nor "near collapse", sustainability of the peg depends on whether or not the currency is being attacked. If the attack is severe, interest rates may need to increase sharply to prevent capital outflows. However, this can complicate the banking sector and thus precipitate an expectation that the money supply will be relaxed. In other words, an interest rate hike may stimulate further expected depreciation.

Since these three conditions have been discussed in a quite detail in Rajan and Sugema (2000 and 2001), there is no need to derive such conditions

under the current model. However, some of the consequences will be discussed further in section 6.5.

#### **6.4.2. Sterilised interventions**

If the authorities decide to cling to the peg while minimising the cost of increasing interest rates, a more likely scenario is that they will allow monetary infusion into the financial market to replace the capital fleeing the country. For example, due to fears that increasing interest rates would hurt the financial system, from the second quarter of 1996, Bank of Thailand extended massive liquidity to ailing banks and financial houses, resulting in a decline in its international reserves (World Bank 1998). Referring to Figure 6.5, this policy response can be shown by a leftward shift of the BP curve, but holding the CC and LM curves fixed. Note that, if capital outflows are not sterilised, the CC and LM curves eventually have to shift leftward.

If this policy stance is maintained, international reserves will continue to drain. Once reserves fall to a low level, the exchange rate is vulnerable to a Krugman-type attack. Indeed, this is a variant of the first-generation model as discussed in section 2.2. Williamson (1999, p.20) has noted this problem for the Thai case:

The Bank of Thailand resisted practically to its last dollar, whereupon it bowed to the inevitable and let the baht float down. All that is terribly familiar, pretty much like any other old-fashioned exchange rate crisis.

Based on the current model, it is easy to assess the feasibility of using this strategy. This can be done by deriving a statistic that can measure the adequacy of reserves to absorb a negative hit in capital flows. The statistic is derived by following the procedure introduced in Jeane (1997) and Masson (1998).

It is convenient to assume that, in the very short-run, say one month or one quarter, trade balances will stay at the current level,  $T_t = T$ . Thus, external imbalances will truly reflect the shifts in capital flows. There are now two

relevant aspects of the expected devaluation: the magnitude of the devaluation and the probability of devaluation ( $\rho_t$ ). The capital account (equation 6.25) is formulated by a linear function as follows:

$$(6.25') \Delta K_t = \alpha_0 + \alpha_1(r_t - r_t^* - rp_t - \rho_t \pi_t)$$

Substituting this into the balance of payments equation (eq. 6.27) yields:

$$(6.26') \Delta R_t = T(Y_t, e_t) + r_t^* K_t + \alpha_0 + \alpha_1(r_t - r_t^* - rp_t - \rho_t \pi_t)$$

stating that foreign exchange reserves should be enough to cover the existing current account deficit and potential capital outflow. It follows that several indicators, such as the ratio of the current account to reserves, the stock of volatile foreign-capital to reserves, the debt service to reserves, the total debt to reserves, and imports to reserves, should indicate a gross picture of balance of payments vulnerability. Moreover, the ratio of M2 to reserves would capture the possibility of capital flight resulting from panic amongst domestic depositors. These ratios might be called reserves adequacy ratios.

The collapse of the peg will occur at time  $t+1$ , if the reserves hit a certain minimum level:

$$R_{t+1} \leq \underline{R}$$

By letting  $b_t \equiv T + r_t^* B + \alpha_0 + \alpha_1(r_t - r_t^* - rp_t) + R_{t+1} - \underline{R}$ , and  $\alpha_2 = \alpha_1 \pi_t$ , the probability of the collapse of the peg can be defined as:

$$(6.29) \rho_t = \text{Prob}_t(b_{t+1} - \alpha_2 \rho_t < 0)$$

Suppose that  $\phi_t = E_t b_t$ , the forecast error can be defined as  $\varepsilon_t = b_t - \phi_t$ , and is assumed to be i.i.d. with zero mean and constant variance,  $\sigma^2$ . The cumulative distribution function for  $b_t$  can be used to formulate expected depreciation as:

$$\rho_t = F_\sigma(\alpha_2 \rho_t - \phi_t)$$

As both the left and right hand side of the above equation has  $\rho_t$ , and therefore a multiple solution is possible. As in Jeane (1997), a critical value may be defined as:



$$(6.30) \quad z \equiv \frac{\alpha_1 \pi_i}{\sigma \sqrt{2\Pi}}$$

where  $\Pi$  is a natural number. A multiple solution can be found if  $z > 1$ , and this provides an appealing condition under which a balance of payments equilibrium can easily flip from a "good" to "bad" equilibrium. If the balance of payments and reserves level exhibit the possibility of having multiple equilibrium, a balance of payments crisis may easily erupt and the reserves are of no use for preventing the crisis.

Mason (1998) introduces another statistic such that:

$$(6.31) \quad w = \sqrt{\log z}$$

The above statistic can be used to calculate the critical values for the fundamental:

$$\bar{\phi} = \alpha_1 F_1(w) - \sigma w$$

$$\underline{\phi} = \alpha_1 F_1(-w) + \sigma w$$

The fundamental can be evaluated as follows:

- (a) crisis zone (deficient reserves):  $\phi \leq \underline{\phi}$
- (b) sufficient reserves:  $\phi \geq \bar{\phi}$
- (c) multiple equilibrium:  $\underline{\phi} < \phi < \bar{\phi}$

The crisis zone (a) implies that a balance of payments crisis can occur without a speculative attack. A balance of payments is said to be fundamentally sound if criterion (b) is satisfied, meaning that a negative shock on the balance of payments can be tackled without adjusting the exchange rate. A currency attack may lead to a crisis if the fundamental is within the multiple equilibrium zone.

The above results can also be derived from the conventional IS-LM model. Thus both IS-LM and CC-LM approaches provide the same inferences for the case of sterilised intervention. This is because the level of foreign

reserves is the only relevant variable for restoring the equilibrium in both models.

### **6.4.3. Floating the currency**

The last choice immediately after an attack would be to float the currency. This is usually the case for countries with a weak banking system or a low level of reserves. As discussed, under a weak banking system an interest rate hike may not be credible to deter speculative attacks. Moreover, defending the currency requires sufficient reserves.

A float means that the government lets the market decide the value of the currency. If a float is adopted when the market is bullish, the currency will appreciate. However, if the currency is floated amid speculative pressure, the likely result is depreciation. Expected devaluation set by speculators will be reflected in depreciation that occurs immediately after the float.

Equation (6.25) suggests that an increase in expected depreciation and/or risk perception can induce capital outflows if the domestic interest rate is not raised. These outflows have to be financed by improving the current account balance (equation 6.27). Since foreign interest rates are assumed constant, this requires improvement in the trade balance. In a dependent-small-open economy, this should mainly come from a reduction in imports. In other words, domestic absorption will need to contract, and such a contraction can be obtained through a real devaluation/depreciation.

The effects of a real devaluation can be captured through the shifts in the CC and LM curves.<sup>12</sup> The LM curve will shift to the left-hand side because of two reasons: increase in price level and a higher demand for money. An increase in price, as a result of a higher import price, reduces the real money balance. In a crisis situation where bank collapses and stock price fall are

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<sup>12</sup> In the IS-LM approach, the LM curve does not shift in response to currency depreciation.

expected, money is often viewed as one of the safest assets, increasing the demand for money.<sup>13</sup>

The effects of currency depreciation on credit and commodity market can be either expansionary or contractionary. It will be contractionary if the income effect is bigger than the substitution effect of devaluation. The impact on export is definitely expansionary, given that export boom can be facilitated by trade financing through the banking system. However, if the banking system become paralysed the full impact on export may not be attainable.

The banking channel is so important in differing the final effects of depreciation. Under the IS-LM framework, it is implicitly assumed that such an expansion is not constrained by the situation in credit market. Because of that, holding the LM curve constant, the shift of the IS curve to the right lead a higher output at the final equilibrium. Thus, ignoring the banking channel may lead to overstatement of the possible favourable impact.

Non-performing loans may increase, leading to a contraction in the credit market (see section 6.6 for further discussion). The dry up of loanable funds from the banking system means less productive activities that can be supported. Thus, unlike the IS-LM approach, rather than shifting rightward, the CC curve may shift leftward.

Moreover, a float and the subsequent devaluation may create panic (Calvo and Mendoza 1996, Sachs *et al.* 1996, Goldstein 1998). Given that the peg prior to the crisis was credible, most foreign debt was probably unhedged. Goldstein (1998) describes this as:

In Indonesia, the main problem was currency mismatching on the part of corporations. Once the value of the rupiah could no longer be assured, and even more so after the currency was floated, belated efforts by Indonesian corporations to hedge their large short foreign-currency position in the market helped to fuel the rupiah's decline. And, as the rupiah fell, its adverse effect on the debt burden of firms only acted to sap market confidence and to stoke the currency's further decline. In South Korea, too, the rollover of short-term foreign-currency-denominated debt -this

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<sup>13</sup> This issue will be further discussed in section 6.5.

time on the part of banks- eventually became the action-forcing event of that crisis.

In summary, the adoption of a float can induce two problems. The ensuing devaluation can be contractionary in the short-run. Moreover, the induced panic can result in the exchange rate over shooting.

## **6.5. *Propagation of a crisis***

The propagation of a financial crisis is discussed in this section. It will be shown that the model can provide a useful systematic analytical framework for analysing the propagation of the crisis. Three issues will be discussed.

First, the crisis causes deterioration in the balance sheet of firms which, in turn, can result in higher non-performing loans. In order to maintain their capital position, banks may have to reduce loans, possibly leading to a further contraction in output.

Second, the crisis may lead depositors and creditors to cast doubt on the reliability of the financial position of the banks. This may trigger a bank run, which forces the banks to liquidate their assets. As a result, capital outflows and further output contraction will be observed.

Third, in order to prevent a breakdown of the financial system, the authorities may provide a blanket guarantee. However, if foreign exchange reserves are insufficient or capital controls are not imposed, this may lead agents to cast doubt over the ability of the authorities to control the money supply. In other words, such a guarantee may not be credible.

### **6.5.1. *Increase in non-performing loans***

Following an interest rate hike and devaluation, there will be some feedback effect from firms to banks. Some firms may be unable to repay bank loans, which, in turn, increase the non-performing loans (NPLs) of banks and the need for greater loan loss provision. Note that the model is a Keynesian or

demand-sided model and, therefore, is unable to capture the effects of devaluation and interest rates on the supply side of the economy. However, these effects may be incorporated exogenously into the model, through the supply of loans without much difficulty.

Let  $\eta$  be the proportion of loans that become non-performing during the first round of the crisis. Given this, the capacity of the banking sector to grant further loans will decline and, therefore, the supply of loans (eq. 6.10) now becomes:

$$(6.10'') \quad L^S = \lambda(r_t^L, r_t^B)(1 - \tau - \eta)BF_t$$

The above representation suggests that the effect of non-performing loans on the loan supply will be the same as that of the reserve requirement ( $\tau$ ). Substituting (6.10'') into (6.15) and differentiating it with respect to  $\eta$  gives:

$$(6.32) \quad \frac{dY_t}{d\eta} = -\frac{A_{r^L}\phi_\eta}{1 - (A_{r^L}\phi_Y + A_Y + T_Y)} < 0$$

In other words, the increase in non-performing loans further reduces aggregate output and therefore tends to propagate the crisis.

Because firms become 'credit rationed', the NPLs will generate a negative feed back effect to output, described as follows. As NPLs rise, the provision for bad loans will also increase, which in turn, weakens the capital position of banks. If new capital is hard to get – and of course this is particularly so in a crisis situation – banks will reduce loans in order to maintain the prescribed CAR. If the interest rate is already high, a reduction in loans may be necessary to minimise losses arising from moral hazard problems.<sup>14</sup> Because loans are cut, investment spending and output will decline. Note that this conclusion will apply only if firms have limited access to the bond market.

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<sup>14</sup> Mankiw (1986) stresses that high interest rates can result in severe credit rationing, collapsing output.

### 6.5.2. Increase in banking fragility

An adverse macroeconomic condition can induce banking fragility, making it harder for depositors to separate sound from weak banks (Mishkin 1996). This 'screening problem' makes them less willing to deposit and lend to banks. Moreover, because banks are interconnected, through the inter-bank money market, there is a real possibility of a systemic crisis.

Bank panic is more likely to occur when balance sheets of banks is weak (Postlewaite and Vives 1987). Therefore, in a crisis situation, runs on deposits are more likely to be observed. Moreover, because of the increasing systemic risk, the runs may also hit sound banks, implying a pure Diamond-Dybvig type run.

In our model, this can be captured through an increase in risk premium. So far, the risk premium only affects capital flows, in that the increase in the premium can lead to a reduction in capital inflows. In the following discussion, we will examine the risk premium relations specifically to the banking sector.

Consider a situation where domestic depositors and foreign creditors cast doubt over the soundness of the banking system. This may trigger a bank run and subsequent capital outflows. A run on deposits will be referred to as *internal bleeding*, while the corresponding capital outflow is called *external bleeding*.<sup>15</sup> The process may be described as follows.

Depositors and creditors pull out from the domestic banking system, holding more reserve money. Because the increase in reserve money holdings carries a higher risk of currency depreciation, some proportion will be converted into foreign exchange denominated assets, triggering capital outflows. In this context, there are two sources of the balance of payments problem. First, foreign creditors pull out funds from the domestic economy. Second, domestic agents transfer domestic financial resources to foreign markets.

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<sup>15</sup> The concept is akin to internal and external drains suggested by Miller (1996). 'Bleeding' is used here to have a stronger expression of the problem.

In order to see the impact of the run, two scenarios are considered. First, it is assumed that the authorities will not bail out the banks and, therefore, equation (6.20) is not operative in the model. In such a case, banks will face a liquidity shortage and may have to liquidate current assets and reduce loans. This will be assessed in this sub-section. Second, we will consider a situation where the authorities fully bail out the banks, implying that the reserve money supply will increase. This second case will be discussed in the next subsection.

In the current model, it is clear from equation (6.25) that  $k_\rho$ , or the first derivative of capital inflows with respect to risk premium, is negative. In other words, the external bleeding will push the BP curve upward (see Figure 6.5). In order to model the internal bleeding, equations (6.7) and (6.17) need to be modified as follows:

$$(6.7') \quad D_t^h = \varphi^D(r_t^D, r_t^B, Y_t, \rho_t, )$$

$\begin{matrix} & & & & \\ & & + & - & \\ & & & & \end{matrix}$

$$(6.17') \quad R_t^h = \varphi^R(r_t^D, r_t^B, Y_t, \rho_t, )$$

$\begin{matrix} & & & & \\ & - & - & + & \\ & & & & \end{matrix}$

Equation (6.7') states that the increase in risk premium (banking fragility) will reduce deposit holdings. Consequently, reserve money will be preferred (eq. 6.17') and some of the funds will be converted into foreign assets (eq. 6.25). The fact that the demand for reserve money will increase is to capture the possibility that some depositors do not have access to international financial assets.

The effect of the drains on output can be traced through the LM and CC curves. The effect transmitted through the money market will be:

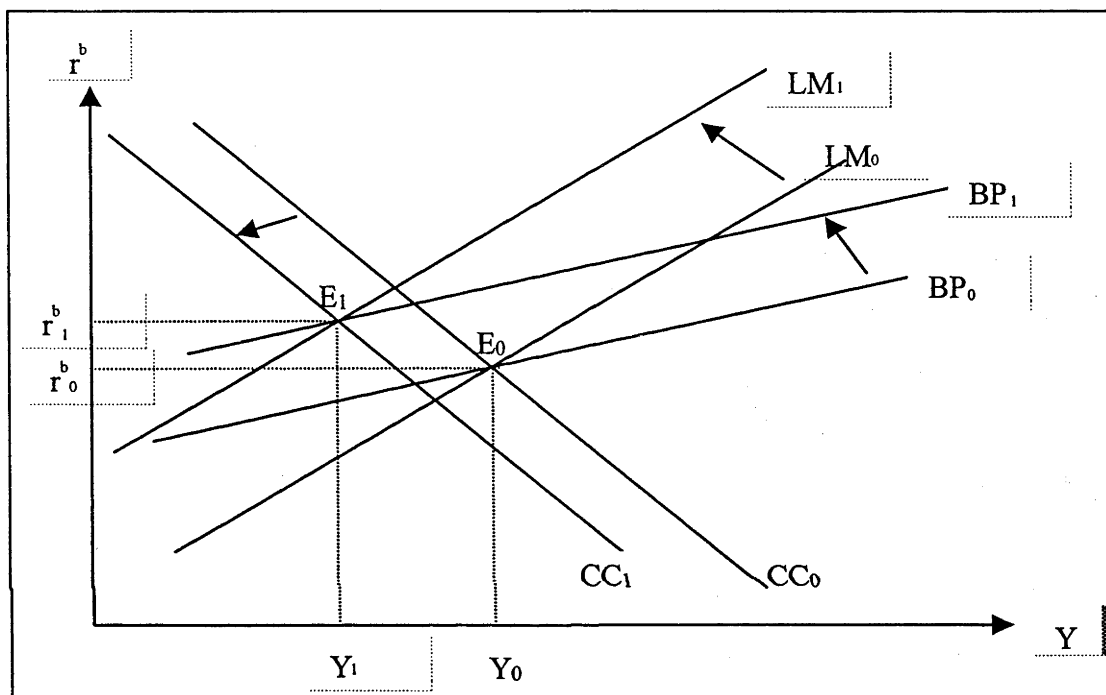
$$(6.33) \quad \left[ \frac{dY_t}{d\rho_t} \right]_{LM} = - \frac{\varphi_\rho^R + \tau\varphi_\rho^D}{\varphi_Y^R + \tau\varphi_Y^D} < 0$$

That is, the LM curve will shift leftward, indicating a higher demand for reserve money. The effect operating through the commodity-credit markets will be:

$$(6.34) \left[ \frac{dY_t}{d\rho_t} \right]_{CC} = - \frac{A_{r^L} \phi_\rho \tau}{1 - (A_{r^L} \phi_Y + A_Y + T_Y)} < 0$$

That is, the CC curve will shift leftward, also indicating a contraction in loans granted by the banks.

**Figure 6.5.** *The effects of bank run and capital outflows*



The final impact will be at point  $E_1$ , with the corresponding output  $Y_1$  and interest rate  $r_1^b$ . The final impact on output will definitely be contractionary, mainly from the drying up of bank loans. The effect on the domestic interest rate, however, is ambiguous. If the shift in the LM and BP curves is larger than the shift in the CC curve, the domestic interest rate will rise, otherwise it will fall. However, in the very short-run, as the money market adjusts faster than the commodity market, interest rates will need to increase.

Note that the discussion, so far, assumes the authorities do not finance the deposit run. Thus, if the run is severe, it may lead to a breakdown of the



financial system. In order to avoid this, the authorities may need to provide a blanket guarantee. The question is whether or not this guarantee will be effective and credible? This issue will be analysed in the following subsection.

### 6.5.3. Increase in reserve money

Because the government is now assumed to provide a blanket guarantee, the bailout function is reintroduce and modified as:

$$(6.20') \quad BO_t = B(\underset{-}{Y_t}, \underset{+}{r_t^L}, \underset{+}{e_t}, \underset{+}{\rho_t})$$

That is the bail out will increase as the risk premium increases. The bailout has two functions. First, it satisfies the increasing need for holding reserve money, as dictated by equation (6.17'). As a result, the money supply will increase, shifting back the LM curve from LM<sub>1</sub> toward LM<sub>0</sub> (see Figure 6.5). Second, it reduces the needs for banks to liquidate their assets, enabling them to continue extending loans. This is associated with the shift of the CC curve from CC<sub>1</sub> toward CC<sub>0</sub>.

Interestingly, the guarantee may not result in a shift of the BP curve back to BP<sub>0</sub>, unless the authorities adopt capital controls or have enough foreign exchange reserves to sterilise capital outflows. An effective capital control can reduce the extent of capital outflows, although it may also prevent capital inflows. Sterilisation of capital outflows can prevent the exchange rate from depreciating further. In effect, capital controls and active sterilisation will shift the BP curve to BP<sub>0</sub>.

Without capital controls or sufficient foreign exchange reserves, the guarantee may not be credible. The idea is that, although the guarantee may be able to eliminate risk perception, it may also raise doubts over the ability of the authorities to manage the money supply. A full guarantee means that all bank liabilities become the governments, implying that the government has to show the public it has sufficient resources to finance the deficit. In the short run, available resources will be in the form of liquid foreign exchange reserves,

as it will be difficult to divert the current year fiscal budget. Because of that, the ratio of foreign exchange reserves to broad money (M2) becomes relevant for measuring the capacity to meet contingent liabilities. If reserves are insufficient, printing money will induce expected depreciation, triggering capital outflows. In other words, the doubt over the capacity to sterilise the increase in money supply can trigger a run on deposits and subsequent capital outflows. Therefore, with insufficient reserves, the blanket guarantee is unlikely to be credible. In such a case, we will observe the following sequence of events: runs on deposits, loss of control over the money supply, capital outflows and further exchange rate depreciation.

If foreign exchange reserves are insufficient, the authorities have to resort to strict capital (outflows) control. Fully effective capital controls can prevent external drain, diminishing the opportunity to benefit from transferring assets abroad. In effect, this will reduce the desire to run on deposits, implying that the guarantee is credible.

In summary, a blanket guarantee alone may be neither credible nor effective in preventing bank runs. It needs to be backed up by either sufficient foreign exchange reserves or very strict capital controls. As will be discussed in Chapter 10, this helps in explaining severe runs in the presence of such guarantee.

## **6.6. Concluding remarks**

In this chapter, a bank centred open-economy macroeconomic model was developed in order to provide a framework for analysing rigorously the role of the banking sector in the origin and propagation of the crisis. The model comes up with three key postulates.

First, the conditions of the banks alter aggregate economic activities. The inclusion of banking channels in the model leads to different inferences compared to the traditional IS-LM model. The interaction between banks and the rest of the economy is captured through changes in the CC and LM curves.

Second, with a weak banking sector it is very difficult to defend an exchange rate peg by means of an interest rate hike. The reason is that the hike tends to aggravate the banking sector weakness, making the probability of a successful attack higher. In other words, an interest rate hike will be neither effective nor credible.

Third, a weak banking sector is likely to play a significant role in propagating the crisis through loan contraction and/or expansion of reserve money. The increase in non-performing loans and bank runs may lead to contraction in the loan market and, consequently, a decline in aggregate economic activities. Moreover, even if a blanket guarantee is provided, it may not be credible in preventing bank runs and subsequent capital outflows if it is not accompanied by active sterilisation and/or capital control. Thus bank runs, capital outflows, sharp exchange rate depreciation and large output contraction will probably still occur in the presence of such guarantee.

# **Chapter 7**

## ***Econometric Procedures and Data***

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### **7.1. Introduction**

Econometric procedures, data sources and time series properties of data series will be discussed in this chapter. In order to carry out the empirics of the theoretical model that was developed in Chapter 6, time series econometric procedures will be employed. Long-run parameters will be estimated using the so-called cointegrating regressions. The estimated coefficients represent stable or equilibrium relationships amongst macroeconomic variables specified in the theoretical model. For the short-run dynamic analyses, impulse response functions will be derived from a vector error correction (VEC) model. In order to have fully specified short-run dynamic equations, the long-run estimates will be imposed on the VEC.

Section 7.2 discusses the derivation of VEC from a vector autoregression (VAR). In order to estimate the VEC, a two-step regression procedure will be employed. Because the efficiency of the regression is hampered by small-sample problems, several structural restrictions are imposed to reduce the number of parameters and colinearity problems, and increase the degree of freedom.

Section 7.3 discusses the procedure for estimating the long-run coefficients. The fully modified OLS method suggested by Phillips and Hansen (1991) is used in estimating the steady state relations. This technique is particularly powerful for small sample size.

Section 7.4 discusses various cointegration tests that will be used to test the presence of long-run relationships amongst macroeconomic variables. In

order to minimise the risk of over rejecting/accepting the presence of cointegration, we adopt two different null hypotheses: no cointegration (Phillips-Perron test) and cointegration (Durbin-Watson and J1-Park tests).

Section 7.5 highlights the procedure for deriving impulse response functions (IRF) from the VEC. An IRF measures the dynamics effects of a particular shock on the variables included in the VEC. These functions will be extensively used in Chapters 9 and 10.

Sections 7.6 and 7.7 describe sources, definitions, and time series properties of the data. Before estimating cointegrating relationships, it is required to specify the data generating processes. If the data series are integrated of degree one (I(1)), the VAR will need to be estimated in the form of VEC. If however the data are stationary or I(0) series, the VAR in level would be robust and efficient.

## 7.2. Vector error correction model

A vector error correction (VEC) can be derived directly from a vector autoregression (VAR) involving non-stationary variables (Engle and Granger 1987). The concept of the error correction mechanism was introduced by Phillips (1957) and Sargan (1964). The idea is very simple: a proportion of the disequilibrium from one period is corrected in the next period. For example, the inflation rate in one period may depend upon the degree of excess demand in the previous period.

The derivation of the vector error correction (VEC) here is based on a theorem by Johansen (1988). Let  $\{Z_t\}$  be a p-th order of VAR and  $Z_t = \{Y : X\}'$ , where Y is a vector of endogenous variables and X is a vector of exogenous variables. The VAR representation of  $Z_t$  can be stated as:

$$(7.1) \quad Z_t = \sum_{i=1}^p \Pi_i Z_{t-i} + \psi_y w_t + a_0 + \varepsilon_t$$

where  $\varepsilon_t$  is a gaussian error term, and  $w_t$  is a vector of stationary variables.

*Theorem:* A vector time series  $Z_t$  has an error correction representation if it can be expressed as:

$$(7.2) \quad \Delta Z_t = \sum_{i=1}^{p-1} \Gamma_i \Delta Z_{t-i} + \Pi Z_{t-p} + \psi_y w_t + a_0 + \varepsilon_t$$

where  $\Gamma_i = -I + \Pi_1 + \dots + \Pi_i \quad (i=1,2,\dots,p-1)$

$$\Pi = -(I - \Pi_1 - \dots - \Pi_p) = \alpha\beta'$$

$$\varepsilon_t = \begin{pmatrix} \varepsilon_{yt} \\ \varepsilon_{xt} \end{pmatrix}, \quad a_0 = \begin{pmatrix} a_{y0} \\ a_{x0} \end{pmatrix}, \quad \Pi = \begin{pmatrix} \Pi_y \\ 0 \end{pmatrix}, \quad \Gamma_i = \begin{pmatrix} \Gamma_{yi} \\ \Gamma_{xi} \end{pmatrix}$$

There are two ways of estimating regression (7.2). First, Johansen suggested a unified maximum likelihood procedure by which  $\alpha$  and  $\beta$  are obtained by decomposing matrix  $\Pi$ . Second, Engle and Granger (1987) proposed that a two-step estimation using cointegrating regression be employed and then  $\beta' Z_{t-1}$ , the estimated residual, be imposed to the above regression. In this study, the Engle-Granger procedure is adopted, but with two modifications.

The modified two-step estimation procedure can be described as follows. First, to estimate the long-run coefficients  $\beta$  using the fully modified OLS (FMOLS) procedure suggested by Phillips and Hansen (1990). Second, the estimated residuals from FMOLS are then imposed on a system of equations as suggested in equation (7.2), by applying a Seemingly Unrelated Regression (SUR) procedure. Under this procedure, the generalised least squares (GLS) is applied to increase the efficiency of the estimation by utilising the information contained in the correlation between disturbances that impinge on each of the relationships that comprise the system.

Two restrictions are imposed on the estimation of the VEC: (1) on the long-run coefficients ( $\beta$ ), and (2) on the coefficients of lagged first difference variables in the VEC ( $\Pi$ ). The theoretical model suggests that  $\beta$  is not a full rank matrix, in that there are only 10 cointegrating vectors representing linear

combinations of 20 variables included in the system. The vectors are specified as: (1) demand for reserve money, (2) bank bail out function, (3) demand for rupiah deposit, (4) demand for foreign exchange deposits, (5) demand for bank loans, (6) consumption function, (7) investment function, (8) export supply, (9) import demand, and (10) capital flow function. The restrictions imposed on the vectors –some of the coefficients are set to zero as implied by the theoretical model- are presented in Table 7.1.

Because of the small sample size, the inclusion of all lagged first difference variables in each equation in the VEC would reduce the degree of freedom and efficiency of estimates significantly. In order to solve this problem the procedure suggested by In and Sugema (1995) is followed, in that the model is divided into several blocks. The criteria for determining which variable is included in each block should be based on the theoretical model. The theory suggests three blocks, namely LM, CC, and BP blocks, and each corresponds to the LM, CC, and BP curves.

The LM block aims to capture the dynamics of the money market. It contains two equations explaining the demand for reserve money and bank bail out function. All variables characterising these equations are included in the LM block, namely GDP, reserve money, rupiah deposit rate, dollar deposit rate, bond rate, lending rate, exchange rate, and bank bailout.<sup>1</sup>

The CC block represents the dynamics of the commodity and credit markets, and contains five equations explaining demand for rupiah deposits, demand for foreign exchange deposits, demand for bank loans, consumption function and investment function. The variables included in the CC block are GDP, rupiah deposit, foreign exchange deposit, bank loan, consumption, investment, rupiah deposit rate, dollar deposit rate, bond rate, lending rate, and real exchange rate.

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<sup>1</sup> All variables are in real terms, unless otherwise specified as a 'nominal' variable.

**Table 7.1.** Restrictions on long-run cointegrating matrix

Variables	Cointegrating Vectors									
	1	2	3	4	5	6	7	8	9	10
X <sub>1</sub> Money	1	0	0	0	0	0	0	0	0	0
X <sub>2</sub> Bank Bailout	0	1	0	0	0	0	0	0	0	0
X <sub>3</sub> Rupiah Deposit	0	0	1	0	0	0	0	0	0	0
X <sub>4</sub> Foreign Exchange Deposit	0	0	0	1	0	0	0	0	0	0
X <sub>5</sub> Bank Loan	0	0	0	0	1	0	0	0	0	0
X <sub>6</sub> Consumption	0	0	0	0	0	1	0	0	0	0
X <sub>7</sub> Investment	0	0	0	0	0	0	1	0	0	0
X <sub>8</sub> Exports (non-oil)	0	0	0	0	0	0	0	1	0	0
X <sub>9</sub> Imports	0	0	0	0	0	0	0	0	1	0
X <sub>10</sub> Capital Flow	0	0	0	0	0	0	0	0	0	1
X <sub>11</sub> GDP	- $\beta_{1.11}$	- $\beta_{2.11}$	- $\beta_{3.11}$	- $\beta_{4.11}$	- $\beta_{5.11}$	- $\beta_{6.11}$	- $\beta_{7.11}$	0	- $\beta_{9.11}$	0
X <sub>12</sub> Rupiah Deposit Rate	- $\beta_{1.12}$	0	- $\beta_{3.12}$	- $\beta_{4.12}$	0	- $\beta_{6.12}$	0	0	0	0
X <sub>13</sub> Bond Rate	- $\beta_{1.13}$	0	- $\beta_{3.13}$	- $\beta_{4.13}$	- $\beta_{5.13}$	0	- $\beta_{7.13}$	0	0	0
X <sub>14</sub> Lending Rate	0	- $\beta_{2.14}$	0	0	- $\beta_{5.14}$	0	0	0	0	0
X <sub>15</sub> Dollar Deposit Rate	0	0	- $\beta_{3.15}$	- $\beta_{4.15}$	0	0	0	0	0	0
X <sub>16</sub> Real Exchange Rate	0	- $\beta_{2.16}$	0	0	0	- $\beta_{6.16}$	- $\beta_{7.16}$	- $\beta_{8.16}$	- $\beta_{9.16}$	0
X <sub>17</sub> Regional Capital Flow	0	0	0	0	0	0	0	0	0	- $\beta_{10.17}$
X <sub>18</sub> Nominal Lending Rate	0	0	0	0	0	0	0	0	0	- $\beta_{10.18}$
X <sub>19</sub> Nominal LIBOR Rate	0	0	0	0	0	0	0	0	0	$\beta_{10.18}$
X <sub>20</sub> Export Capacity	0	0	0	0	0	0	0	- $\beta_{8.20}$	0	0



**Table 7.2.** Restrictions on lagged-first-difference-explanatory variables in the VEC

Dependent Variables																					
	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>	X <sub>7</sub>	X <sub>8</sub>	X <sub>9</sub>	X <sub>10</sub>	X <sub>11</sub>	X <sub>12</sub>	X <sub>13</sub>	X <sub>14</sub>	X <sub>15</sub>	X <sub>16</sub>	X <sub>17</sub>	X <sub>18</sub>	X <sub>19</sub>	X <sub>20</sub>	
L a g g e d	X <sub>1</sub>	α <sub>1.1</sub>	α <sub>2.1</sub>	0	0	0	0	0	0	0	α <sub>11.1</sub>	α <sub>12.1</sub>	α <sub>13.1</sub>	α <sub>14.1</sub>	α <sub>15.1</sub>	α <sub>16.1</sub>	0	α <sub>18.1</sub>	0	α <sub>20.1</sub>	
	X <sub>2</sub>	α <sub>1.2</sub>	α <sub>2.2</sub>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	X <sub>3</sub>	0	0	α <sub>3.3</sub>	α <sub>4.3</sub>	α <sub>5.3</sub>	0	0	0	0	α <sub>11.3</sub>	α <sub>12.3</sub>	α <sub>13.3</sub>	α <sub>14.3</sub>	α <sub>15.3</sub>	0	0	0	0	0	
	X <sub>4</sub>	0	0	α <sub>3.3</sub>	α <sub>4.4</sub>	α <sub>5.4</sub>	0	0	0	0	α <sub>11.4</sub>	α <sub>12.4</sub>	α <sub>13.4</sub>	α <sub>14.4</sub>	α <sub>15.4</sub>	0	0	0	0	0	
	X <sub>5</sub>	0	0	α <sub>3.5</sub>	α <sub>4.5</sub>	α <sub>5.5</sub>	0	0	0	0	α <sub>11.5</sub>	α <sub>12.5</sub>	α <sub>13.5</sub>	α <sub>14.5</sub>	α <sub>15.5</sub>	0	0	0	0	α <sub>20.5</sub>	
	X <sub>6</sub>	0	0	0	0	0	α <sub>6.6</sub>	α <sub>7.6</sub>	0	0	0	α <sub>11.6</sub>	0	0	0	0	0	0	0	0	
	X <sub>7</sub>	0	0	0	0	0	α <sub>6.7</sub>	α <sub>7.7</sub>	0	0	0	α <sub>11.7</sub>	0	0	0	0	0	0	0	α <sub>20.7</sub>	
	X <sub>8</sub>	0	0	0	0	0	0	0	α <sub>8.8</sub>	α <sub>9.8</sub>	α <sub>10.8</sub>	α <sub>11.8</sub>	0	0	0	0	α <sub>16.8</sub>	0	0	0	
	X <sub>9</sub>	0	0	0	0	0	0	0	α <sub>8.9</sub>	α <sub>9.9</sub>	α <sub>10.9</sub>	α <sub>11.9</sub>	0	0	0	0	α <sub>16.9</sub>	0	0	0	
	X <sub>10</sub>	0	0	0	0	0	0	0	α <sub>8.10</sub>	α <sub>9.10</sub>	α <sub>10.10</sub>	0	0	0	0	0	α <sub>16.10</sub>	0	0	0	
V a r i a b l e s	X <sub>11</sub>	α <sub>1.11</sub>	α <sub>2.11</sub>	α <sub>3.11</sub>	α <sub>4.11</sub>	α <sub>5.11</sub>	α <sub>6.11</sub>	α <sub>7.11</sub>	α <sub>8.11</sub>	α <sub>9.11</sub>	α <sub>10.11</sub>	α <sub>11.11</sub>	α <sub>12.11</sub>	α <sub>13.11</sub>	α <sub>14.11</sub>	α <sub>15.11</sub>	α <sub>16.11</sub>	0	α <sub>18.11</sub>	0	0
	X <sub>12</sub>	α <sub>1.12</sub>	α <sub>2.12</sub>	α <sub>3.12</sub>	α <sub>4.12</sub>	α <sub>5.12</sub>	α <sub>6.12</sub>	α <sub>7.12</sub>	0	0	0	α <sub>11.12</sub>	α <sub>12.12</sub>	α <sub>13.12</sub>	α <sub>14.12</sub>	α <sub>15.12</sub>	α <sub>16.12</sub>	0	0	0	
	X <sub>13</sub>	α <sub>1.13</sub>	α <sub>2.13</sub>	α <sub>3.13</sub>	α <sub>4.13</sub>	α <sub>5.13</sub>	α <sub>6.13</sub>	α <sub>7.13</sub>	0	0	0	α <sub>11.13</sub>	α <sub>12.13</sub>	α <sub>13.13</sub>	α <sub>14.13</sub>	α <sub>15.13</sub>	α <sub>16.13</sub>	0	0	0	
	X <sub>14</sub>	α <sub>1.14</sub>	α <sub>2.14</sub>	α <sub>3.14</sub>	α <sub>4.14</sub>	α <sub>5.14</sub>	0	0	0	0	0	α <sub>11.14</sub>	α <sub>12.14</sub>	α <sub>13.14</sub>	α <sub>14.14</sub>	α <sub>15.14</sub>	α <sub>16.14</sub>	0	0	0	
	X <sub>15</sub>	0	0	α <sub>3.15</sub>	α <sub>4.15</sub>	α <sub>5.15</sub>	0	0	0	0	0	α <sub>11.15</sub>	α <sub>12.15</sub>	α <sub>13.15</sub>	α <sub>14.15</sub>	α <sub>15.15</sub>	α <sub>16.15</sub>	0	0	0	
	X <sub>16</sub>	α <sub>1.16</sub>	α <sub>2.16</sub>	0	0	0	α <sub>6.16</sub>	α <sub>7.16</sub>	α <sub>8.16</sub>	α <sub>9.16</sub>	α <sub>10.16</sub>	α <sub>11.16</sub>	α <sub>12.16</sub>	α <sub>13.16</sub>	α <sub>14.16</sub>	α <sub>15.16</sub>	0	0	0	α <sub>20.16</sub>	
	X <sub>17</sub>	0	0	0	0	0	0	0	α <sub>8.17</sub>	α <sub>9.17</sub>	α <sub>10.17</sub>	0	0	0	0	0	0	α <sub>17.17</sub>	α <sub>18.17</sub>	0	0
	X <sub>18</sub>	0	0	0	0	0	0	0	α <sub>8.18</sub>	α <sub>9.18</sub>	α <sub>10.18</sub>	0	0	0	0	0	0	0	α <sub>18.18</sub>	0	0
	X <sub>19</sub>	0	0	0	0	0	0	0	α <sub>8.19</sub>	α <sub>9.19</sub>	α <sub>10.19</sub>	0	0	0	0	0	0	0	α <sub>18.19</sub>	α <sub>19.19</sub>	0
	X <sub>20</sub>	0	0	0	0	0	0	0	α <sub>8.20</sub>	α <sub>9.20</sub>	α <sub>10.20</sub>	0	0	0	0	0	0	0	0	0	α <sub>20.20</sub>

L a g g e d V a r i a b l e s

The BP block captures the dynamics of the balance of payments. It contains three cointegrating vectors characterising export supply, import demand, and capital flow function. The variables included are (non-oil) export, import, real exchange rate, GDP, export capacity index, net capital flows, nominal domestic lending rate, and nominal foreign lending rate.

In doing this, the number of lagged variables can be reduced significantly. For instance, only 8 variables are included in the BP block, instead of 20 variables as in the original unrestricted VEC.

In the estimation, all blocks are estimated together using a SUR procedure. Thus there are 20 equations in the system, as in the unrestricted VEC. However, some of the lagged-first-difference variables are set to zero in each equation in the system, i.e., variables that do not belong to the corresponding blocks are restricted. The restrictions imposed to the full model are presented in Table 7.2.

### ***7.3. Phillips-Hansen procedure***

In order to estimate the long run coefficients, which reflect stable relationships amongst macroeconomic variables as suggested by the model developed in Chapter 3, we employ FMOLS developed by Phillips and Hansen (1990). The Phillips-Hansen procedure relies on semi-parametric bias corrections, which remove nuisance parameters hampering statistical inference of estimates obtained using simple OLS. The parameters estimated using this procedure are, therefore, both asymptotically unbiased and valid, and asymptotic t-statistic for the parameters can be derived from the corrected covariance matrix. Moreover, this procedure is particularly powerful for small sample estimations.<sup>2</sup>

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<sup>2</sup> Inders (1993) provides a useful simulation-based comparison of this and other cointegrating techniques. Phillips and Hansen (1990) and Phillips and Loretan (1991) show that FMOLS work effectively for sample sizes as small as 50.

Either the simple OLS based estimation procedure suggested by Engle and Granger (1987) or the maximum-likelihood methods advocated by Johansen (1988) could have been used. The main problem with the Engle-Granger procedure is that the OLS estimator has an asymptotic distribution, which is non-normal and affected by nuisance parameters. This means the standard t-statistics will not be valid asymptotically. On the other hand, the FMOLS corrects the estimates for both endogeneity and nuisance parameters, so that the t-statistics follow the standard normal distribution.

Unlike other cointegration procedures, Johansen's method integrates both the long run and short run dynamic in a unified fashion. Moreover, this method can determine the number of cointegrating vectors. However, the small-sample properties of this method are still unknown and often result in hardly interpretable coefficients. Recent applications of this procedure have resulted in at least two practical problems (Hall 1990). First, both the trace and determinant test statistics used to determine the number of cointegrating relationships, and the estimates of the long run coefficients, are very sensitive to the choice of the lag length imposed in the initial VAR. The second problem is that severe multi-collinearity may appear between some of the variables, especially when dealing with VAR of a reasonable size. This, in turn, makes the point estimates of the long run coefficients even more sensitive to the choice of lag length.

The Phillips-Hansen procedure may be presented in a bivariate fashion as in Banerjee et.al (1993).<sup>3</sup> Let the variable  $y_{1t}$  and  $y_{2t}$  be generated by:

$$(7.3) \quad y_{1t} = \beta y_{2t} + \Pi k_{1t} + u_{1t}$$

$$(7.4) \quad y_{2t} = y_{2t-1} + u_{2t}$$

The innovation vector defined as  $u_t = (u_{1t}, u_{2t})'$  and has mean vector and covariance matrix given by  $(0,0)'$  and  $\Sigma$ , respectively. Note that when  $u_{1t}$  and

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<sup>3</sup> A brief and digestible discussion on this procedure can be found in Banerjee et.al (1993) section 7.7. However, it contains several serious mathematical faults, and therefore one needs to refer back to Phillips and Hansen (1990).

$u_{2t}$  are autocorrelated and intercorrelated, the regression in (7.3), without using any information about (7.4), can yield a biased estimate of  $\beta$ , even in a fairly large sample. Park and Phillips (1988) offer a full-system maximum likelihood estimation to correct the bias. Alternatively, Phillips and Hansen (1990) propose a semi-parametric correction applied to single-equation estimation in order to have median-unbiased and asymptotically normal estimates.

The semi-parametric correction is done firstly by decomposing the long run covariance matrix  $\Omega$  as follows:

$$(7.5) \quad \Omega = \Sigma + \Lambda + \Lambda'$$

$$\text{where } \Sigma = E(u_0 u_0'), \quad \Lambda = \sum_{k=1}^T E(u_0 u_k')$$

and defines

$$(7.6) \quad \Delta = \Sigma + \Lambda$$

The fully modified least-squares estimators of  $\beta$  is;

$$(7.7) \quad \beta^+ = \left( \sum_{t=1}^T y_{2t}^2 \right)^{-1} \left[ \left( \sum_{t=1}^T y_{1t}^+ y_{2t} \right) - T \delta^+ \right]$$

$$\text{where } y_{1t}^+ = y_{1t} - \Delta_{12} \Omega_{22}^{-1} u_{2t}$$

$$\delta^+ = \Lambda \begin{bmatrix} 1 \\ -\Delta_{12} \Omega_{22}^{-1} \end{bmatrix}$$

The standard error can be obtained such that

$$(s^+)^2 = \Omega_1^+ \left( \sum_{t=1}^T y_{2t}^2 \right)^{-1}$$

$$\text{where } \Omega_1^+ = \Omega_{11} - \Omega_{12}^2 \Omega_{22}^{-1}$$

Finally the normally distributed t-statistic can be derived as:

$$t^+ = \frac{\beta^+}{s^+}$$

In order to correct the estimates for endogeneity and nuisance parameters, it is necessary to determine  $\Lambda$  and for this study the 'Parzen window' is used as the weight for  $u_k$ . Note that the optimal number of truncation lags  $k$  involved in the window is chosen such that it provides the Durbin-Watson statistic closest to 2 to minimise the autocorrelation problem.

## 7.4. Cointegration tests

In order to test the stationarity of the residual from the first step regression, three different cointegration tests are employed, namely PP (Phillips-Perron), CRDW (cointegrating regression Durbin-Watson), J1 (Park's semi-parametric) tests. The first test has the null of non stationarity, while the last two tests have the null of stationarity. By employing cointegration tests with different null hypotheses, the error of over rejecting or accepting the presence of cointegration can be minimised. Note that the last tests tend to minimise the error of rejecting cointegration.

The CRDW statistic, as suggested by Sargan and Bhargava (1983) is :

$$(7.8) \quad CRDW = \frac{\sum_{t=2}^T (\hat{u}_t^+ - \hat{u}_{t-1}^+)^2}{\sum_{t=1}^T (\hat{u}_t^+)^2}$$

where  $\hat{u}_t^+$  is the residual from the fully modified cointegrating regression. Thus nuisance parameters have mostly been removed from the computation of CRDW. If the OLS is simply used to estimate the long run coefficient, CRDW will be biased in favour of accepting the hypothesis of cointegration (Banerjee et.al 1993).

The J1 statistic developed by Park (1991) has specifically been built to accompany the FMOLS. The test is very straightforward and involves two

nested regressions. The first regression is the FMOLS, as outlined in the previous section and, from this regression, we can obtain the residual sum of squares defined as  $RSS1$ . In the second regression, the FMOLS is augmented with a number of time trend polynomials and gives  $RSS2$ . The test statistic can then be derived as:

$$(7.9) \quad J1 = \frac{RSS1 - RSS2}{\Omega_1^+}$$

This statistic has asymptotic distribution of  $\chi_{(n)}$ , where  $n$  is the number of time trend polynomials included in the second regression.

As an alternative to the above two tests, the PP test which has the null of no cointegration is also employed. The test is carried out by regressing the first difference of residual of the FMOLS on the lagged value of the residual, such that:

$$(7.10) \quad \Delta \hat{u}_t^+ = \alpha_* \hat{u}_{t-1}^+ + v_t$$

As in SHAZAM, the Newey and West (1987) method is used to construct an estimate of the error variance from (7.7):

$$(7.11) \quad \frac{1}{T} \sum_{t=1}^T v_t^2 + \frac{1}{T} \sum_{s=1}^l w(s, l) \sum_{t=s+1}^T v_t v_{t-1}$$

where  $w(s, l)$  is a window with  $l$  truncation lag and SHAZAM defines the window as:

$$w(s, l) = \frac{1-s}{l+1}$$

Then the t-statistic on  $\alpha_*$  can be constructed using the corrected error variance as in (7.11).

## 7.5. Impulse Response Analysis

The purpose of the impulse response analysis (IRA) is to trace the effect on the system of an exogenous shock to a given variable in the system. The effect of any unexpected shock to the system can be traced in terms of deviations of the shocked time paths from the expected time path given by the model. This technique is quite useful in certain types of policy and sensitivity analyses. The procedure to obtain an impulse response function from a VEC can be outlined as follows.

Assumes that  $\Pi$  is not a full-rank matrix, the solution of (7.2) involves common stochastic trends, and is given by:

$$(7.12) \quad Z_t = Z_0 + C(1)S_t + C^*(L)(h_t - h_0)$$

where  $h_t = \psi w_t + u_t$

$$S_t = \sum_{i=1}^t u_i, \quad t=1,2,3,\dots$$

$$C(L) = C(1) + (1-L)C^*(L)$$

$$C^*(L) = \sum_{i=0}^{\infty} C_i^* L^i$$

Note that  $L$  is the one period lag operator, and  $C_i^*$  matrices are obtained recursively from:

$$(7.13) \quad C_i^* = C_{i-1}^* \Phi_1 + \dots + C_{i-p}^* \Phi_p$$

for  $i=1,2,\dots$ , with  $C_0^* = I - C(1)$ , and  $C_i^* = 0$  for  $i < 0$ . Matrix  $C(1)$  can be obtained directly such that:

$$(7.14) \quad C(1)\Pi = 0 = \Pi C(1)$$

The matrices,  $\Phi_i$  can be obtained from coefficient matrices such that:

$$\Phi_1 = I - \Pi + \Gamma_1$$

$$\Phi_i = \Gamma_i - \Gamma_{i-1}, \quad i = 1, 2, \dots, p-1$$

$$\Phi_p = -\Gamma_{p-1}$$

Let  $A_i = C(1) + C_i^*$ , and based on (6.4) and (6.5)  $A_i$  can be obtained recursively as:

$$(7.15) \quad A_i = A_{i-1}\Phi_i + \dots + A_{i-p}\Phi_p, \quad \text{for } i=1,2,\dots$$

where  $A_0 = I$ ,  $\lim_{i \rightarrow \infty} A_i = C(1)$ , and  $A_i = 0$  for  $i < 0$ .

Let  $\Sigma$  be the covariance matrix of the innovation,  $\varepsilon_t$ , and  $\sigma_{ij}$  be the component of the matrix. For a shock in variable  $i$ , it is necessary to define the size of the shock and an  $1 \times m$  matrix,  $e_i = (0, \dots, 1, \dots, 0)$  where the  $i$ -th component of the matrix is set to 1, while other components are set to zero. The size of the shock is usually set such that  $\delta_i = \sqrt{\sigma_{ii}}$ . The corresponding generalised impulse responses at time  $T+N$  are given by:

$$(7.16) \quad GI_i(\beta_j' Z_t, N) = \frac{\beta_j' A_N \Sigma e_i}{\sqrt{\sigma_{ii}}}$$

where  $i=1,2,\dots,m$ ;  $j=1,2,\dots,r$  and  $N=1,2,\dots$ .

## 7.6. Data sources and variable definitions

The data series used in the empirical analyses are gathered from three sources; the Central Agency of Statistic (BPS) for national account data, Indonesian Financial Statistics (Bank Indonesia) for monetary and banking data, and International Financial Statistics (IMF) for capital flows. The data are quarterly and cover the period from 1984:Q1 to 1997:Q2. All data are transformed into real terms except for the capital flows.

National account data used are GDP, consumption, investment, export and imports. Each of these variables has its own deflator, and the real variables are defined as the nominal values divided by the corresponding



deflator. Financial aggregates used are reserve money, total deposit, and bank loans. CPI is used to deflate these variables.

Four interest rates are used; deposit rate, lending rate, bond rate, and LIBOR rates. The deposit rate is defined as the weighted average of time deposit rates, where the weights are the share of each category of time deposits with respect to the total time deposit. The lending rate is the weighted average of interest rates on loans for investment and working capital. The LIBOR rate is the simple average of deposit rates with maturity of not more than 12 months. The bond rate used is the SBI (central bank certificate) rate.

For deposit and lending rates, the real interest rate are defined as the nominal interest rate minus the annualised inflation rate during the following three months. For the LIBOR rate, the real interest rate is defined as the nominal rate minus annualised inflation plus the annualised depreciation rate of the currency during the following three months. Thus the real LIBOR rate represents the real income for holding dollar deposits in rupiah terms.

The real exchange rate is a trade-weighted index of Indonesia against its ten major trading partners. The countries included in the calculation are Japan, USA, Singapore, South Korea, Germany, Taiwan, China, Australia, Netherlands, and United Kingdom. Following Edwards [1989], the wholesale price index (WPI) of those countries is used as a proxy for  $P^*$ , and Indonesia's consumer price index (CPI) is used as the domestic price.

Table 7.3. Variable Definition and Sources

Variable	Definition
Real GDP	Nominal GDP deflated by GDP deflator; <i>CBS</i>
Real Money	Stock of reserve money deflated by CPI; <i>BI</i>
Real Rupiah Deposit	Stock of rupiah deposit deflated by CPI; <i>BI</i>
Real Foreign Exchange Deposit	Stock of deposit denominated in foreign currency deflated by CPI (stated in US\$); <i>BI</i>
Real Bank Loan	Total bank loans to private sector deflated by CPI; <i>BI</i>
Real Consumption	The sum of nominal government and private consumption deflated by consumption deflator; <i>CBS</i>
Real Investment	The sum of nominal government and private investment deflated by investment deflator; <i>CBS</i>
Real Exports	Value of non-oil export divided by its price index; <i>CBS</i>
Real Imports	Value of total import divided by its price index; <i>CBS</i>
Real Bank Bailout	Bank borrowing from the central bank deflated by CPI; <i>BI</i>
Real Rupiah Deposit Rate	Weighted average of interest rates on 1 to 12 month rupiah deposit corrected for the actual inflation rate of the following quarter; <i>BI</i>
Real Bond Rate	Simple average of interest rates on central bank certificate (SBI) corrected for the inflation rate of the subsequent quarter; <i>BI</i>
Real Lending Rate	Weighted average of interest rates on working capital and investment loans corrected for the inflation rate of the subsequent quarter; <i>BI</i>
Real Exchange Rate	Nominal exchange rate times world price divided by domestic price. The world price is defined as a trade-weighted index of wholesale prices (WPI) of Indonesia's ten major trading partners (Japan, USA, Singapore, South Korea, Germany, Taiwan, China, Australia, Netherlands, and United Kingdom). Domestic price is the consumer price index (CPI); <i>IFS</i>
Capital Flow	Nominal net capital inflows; <i>BI</i>
Regional Capital Flow	The sum of nominal net capital flows to the three neighbouring countries: The Philippines, Malaysia and Thailand; <i>IFS</i>
LIBOR Rate	Simple average of US \$ London Inter-Bank Offered Rate; <i>IFS</i>
Export Capacity	Manufacturing production index (proxy); <i>CBS</i>

The use of official data from Central Bureau of Statistics (CBS), Bank Indonesia (BI), and International Financial Statistic (IFS) is due to two reasons. First, the data are easily obtained from official publication and databases. Thus error in data can be crosschecked with other sources. Second, official data are usually standardised in accordance with a certain international convention. Although, there may be some doubts over the quality of the data, at least they are the best that are available.

Testing the quality of data is beyond the scope this study. Data published by CBS and BI are the most widely used for analysing Indonesian macroeconomic. However, this does not imply that the quality of the data can be taken for granted. In particular, the quality of data on capital flows is questionable. It is widely known that there is no requirement for residents and foreigners to report their cross border financial transactions to the monetary authority. Consequently, the authority did not have accurate records on total private foreign debts and private capital flows. Thus, econometric estimation on the determinant of net capital inflow may not be robust due to this data quality constraint.

### ***7.7. Time series properties of the data***

Prior to the estimations of the model, univariate tests are conducted to examine the time series properties of the data series which follow Dickey and Fuller (1979 and 1981), Phillips (1987) and Perron (1988). The augmented Dickey Fuller (ADF) test is used in order to capture possible high order of autocorrelation processes. The number of lags included in the estimation is determined by Swartz Bayesian Criteria (SBC) and Akaike Information Criteria (AIC). The Phillips-Perron (PP) test removes nuisance parameters by employing non-parametric modification on the error variance. The tests are applied to both the level and first difference of the series.

The results are presented in Table 7.4. Both ADF and PP tests confirm that all series are non-stationer in the level and stationer in the first difference, except the real exchange rate. While ADF confirms that the real exchange rate

is an I(1) process, PP indicates that it might be an I(0) process. However, if the 10 per cent significant level is used, PP also suggests that the variable is non-stationary. In sum, the tests suggest that the data generating process relating to all variables are integrated of degree one. Therefore, VEC is the appropriate procedure for estimating the model. On the other hand, VAR in the first difference cannot be used because it is misspecified.

**Table 7.4. Unit Root Tests**

Variable	Level		First Difference	
	ADF	PP	ADF	PP
GDP	-2.79	-0.63	-4.15	-12.50
Money	-2.45	-3.17	-3.96	-10.94
Rupiah Deposit	-1.68	-2.03	-3.54	-9.59
Foreign Exchange Deposit	-2.79	-2.78	-5.29	-10.40
Bank Loan	-1.28	-0.80	-4.07	-4.72
Consumption	-1.68	-1.00	-5.23	-9.35
Investment	-1.80	-1.81	-5.19	-9.81
Exports (non-oil)	-2.14	-2.12	-4.43	-12.57
Imports	-3.07	-3.16	-4.15	-9.73
Bank Bailout	-2.63	-2.50	-4.17	-9.39
Rupiah Deposit Rate	-2.49	-2.54	-4.97	-7.04
Bond Rate	-3.08	-3.02	-5.51	-11.92
Lending Rate	-2.69	-2.71	-5.47	-7.41
Dollar Deposit Rate	-1.76	-3.17	-4.04	-7.94
Real Exchange Rate	-3.18	-3.46	-9.39	-9.09
Capital Flow	-2.23	-2.55	-6.06	-7.47
Regional Capital Flow	-1.33	-2.38	-4.03	-11.98
Nominal Lending Rate	-3.27	-3.26	-3.89	-7.62
Nominal LIBOR Rate	-1.62	-1.73	-3.79	-6.77
Export Capacity	-3.29	-1.12	-3.95	10.54

Notes: The 5 per cent critical value for both ADF and PP (with trend) is -3.41

# **Chapter 8**

## ***Macroeconomics Interrelations***

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### **8.1. Introduction**

After developing a theoretical model in Chapter 6 and presenting econometric procedures in Chapter 7, the empirical analyses will be presented in this and the next two chapters. By employing cointegrating regression, this chapter discusses the interrelationships amongst macroeconomic variables as suggested by the model. Based on these estimates, the long-run transmission mechanisms can be derived, characterising permanent adjustment process to a macroeconomic shock.

The rest of the chapter is organised as follows. Section 8.2 discusses the determinants of domestic absorption. Section 8.3 discusses the regression results for the demand for deposit and bank loans. Section 8.4 highlights the determinant of money demand and supply. This is followed by a discussion of the determinants of the trade and capital account balances. Throughout the chapter, the estimates will be interpreted in conjunction with the state of the macroeconomy before the crisis. This chapter closes with a discussion on the relevance of the estimates for analysing the adjustment process and policy responses during the crisis.

### **8.2. Domestic absorption**

#### **8.2.1. Consumption function**

In this subsection, a cointegrating regression is estimated to explain consumption. Real consumption is defined as the sum of private and government consumption deflated by the consumer price index. The

explanatory variables are real GDP, real exchange rate and real deposit rate. All variables are transformed into log form, except for the interest rate.

Table 8.1 presents the estimated consumption function. All cointegration tests suggest that consumption is a stable function of GDP, the real exchange rate and real deposit rate. The overall fit of the model is satisfactory in terms of high value of  $R^2$  and significant F-test.

**Table 8.1.** *Estimates for consumption function*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	0.9273	33.6628
Real deposit rate	-0.0070	-0.0516
Log of real exchange rate	-0.2405	-3.7038
Constant	1.5654	4.4740
<i>Statistical Properties</i>		
$R^2 = 0.958$	$F = 404.490$	$CRDW = 1.854$
$PP(t) = -7.051$	$PP(Z) = -41.602$	$Park's J1(0,3) = 1.659$

Consumption is relatively more sensitive to a change in real GDP than to the other variables. In other words, GDP is the main determinant of consumption. The elasticity of consumption with respect to GDP is 0.93.

The coefficient attached to the real exchange rate suggests that for every one per cent of real depreciation in the currency, consumption will fall by 0.24 per cent. Since the real exchange rate measures the relative price between tradable and non-tradable goods, depreciation should reduce consumption of tradable goods. However, since the elasticity is small, consumption would not be much affected by devaluation. The effect of a real devaluation on consumption is channelled through the fall in real wages, as devaluation affects the aggregate price level (Krugman and Taylor 1976).

There is no strong evidence that a change in the interest rate affects consumption. The coefficient of the interest rate is very small and is

statistically insignificant. The results seem to suggest that the negative effect on consumption of higher interest rate is counterbalanced by its positive income effect.

### 8.2.2. Investment function

To shed light on the investment function, we employ cointegrating regression with real investment as the dependent variable and the explanatory variables are: real investment, real GDP, real exchange rate, real lending rate and real bond rate. The results are presented in Table 8.2. All cointegration tests strongly confirm a stable relationship characterising the investment function.

The elasticity of investment with respect to GDP is slightly higher than one (1.03), suggesting a higher rate of growth of investment compared to the growth in GDP. This is not surprising, since the sample period of the estimation is characterised by high capital inflow, especially during the nineties. Moreover, banking liberalisation helped in increasing the availability of loanable funds.

**Table 8.2.** Regression results characterising investment function

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	1.0331	12.9400
Real lending rate	-1.6200	-1.8953
Real bond rate	-0.1300	-0.0258
Log of real exchange rate	-0.2968	-2.0311
Constant	-0.0795	-0.4249
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.9817	F = 1408.229	CRDW = 1.287
PP (t) = -5.224	PP (Z) = -38.766	Park's J1(0,3) = 1.756

Investment is elastic with respect to the real exchange rate but the magnitude of the coefficient is higher than the elasticity of consumption to the

real exchange rate. This suggests that, in the case of devaluation, a reduction in domestic absorption will come mainly from a fall in investment rather than in consumption. In other words, firms, or the production side of the economy, are more responsive to the shock in real exchange rate. This implies that the reduction in imports would be from investment related imports, such as capital goods and raw materials. Moreover, the negative impact of devaluation on investment may also be pronounced through the burden created from foreign exchange denominated debts (see for example Krugman and Taylor 1976).

The estimated coefficient of the real bond rate is statistically insignificant. This may be due to the fact that the bond market is still relatively rudimentary in Indonesia. Note that total bonds registered and rated by Pefindo – the official rating company - were only about Rp 6 trillion, compared with Rp 329 trillion of bank loans, at the onset of the crisis (*Infobank*, July 1999). In other words, the credit market is bank dominated.

The coefficient attached to the real lending rate suggests that a one per cent increase in the rate will reduce investment by 1.6 per cent, indicating that investment is more responsive to the change in the real lending rate than to the other variables. This implies that firms are responsive to the change in real interest rate. As argued by Bernanke and Gertler (1990), a rise in the interest rate can induce a higher premium of hiring external capital, and therefore firms will reduce investment. This is particularly so if firms are highly leveraged by banks. As discussed in section 3.5, the ratio of bank loans to GDP was trending upward. Thus, it is not surprising that investment is very sensitive to the interest rate.



## **8.3. Deposit and loan markets**

### **8.3.1. Demand for deposits**

Depositors can hold either rupiah or foreign exchange denominated deposits in foreign exchange banks, but only rupiah deposits in banks without a foreign exchange licence. In the following estimations, the demand for rupiah and foreign exchange deposits will be estimated separately for two reasons. First, foreign exchange deposits account for about 25 to 30 per cent of total deposits and, therefore, depreciation in the currency can significantly affect the total value of deposits. Second, the interest rates attached to these deposits are different from those attached to other deposits, and therefore must represent a different menu of risk and returns. Moreover, not all depositors have access to foreign exchange deposits, especially in remote areas. There may also be some depositors who are not fully aware of the exchange rate risk affecting their financial wealth. Therefore, it is reasonable to assume that these two types of deposit are not perfect substitutes for each other.

#### **Demand for rupiah deposit**

In the following regression, the log of real rupiah deposit is treated as the dependent variable. The real deposit is defined as the sum of time, saving and demand rupiah deposits deflated by the consumer price index.<sup>1</sup> The explanatory variables are real rupiah deposit rate, real bond rate, real dollar deposit rate, and log of real GDP. Real interest rates used are in 'proportionate forms'.<sup>2</sup> In order to capture the impact of the PAKTO, the log of the number of bank branches is included in the regression. A dummy variable representing the change in reserve requirement which takes a value one for 1984:1-1988:3

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<sup>1</sup> Note that demand deposits are interest-yielding assets and therefore cannot be treated as if they were non-interest yielding assets like reserve money. Treating demand deposit and reserve money as one group (M1) in a regression was attempted, but the results of the regression are unsatisfactory.

<sup>2</sup> This implies the coefficients on interest rates are only 'approximate' estimates of elasticities.

and zero for the other quarters is also included to capture possible overall shift in the level of deposit holdings independently of the explanatory variables considered.<sup>3</sup>

The results are presented in Table 8.3. Phillips-Perron, CRDW, J1 tests support the existence of cointegration, suggesting a stable long-run relationship between dependent and explanatory variables.

The coefficient on real GDP suggests that a one per cent increase in GDP bring about a 2 per cent increase in the demand, suggesting a persistent financial deepening. In other words, deposits tend to grow faster than GDP. This finding is consistent with the notion discussed in section 3.5.3 that the ratio of deposits to GDP increased persistently during the pre-crisis period (see Figure 3.3).

**Table 8.3.** *The demand for real rupiah deposits*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	2.1258	19.1206
Real rupiah deposit rate	1.0900	3.4541
Real bond rate	-0.1900	-1.6041
Real dollar deposit rate	-0.1100	-2.6301
Log of number of bank branch	0.0116	3.3618
Dummy of reserve requirement	-0.2340	-4.0801
Constant	-4.5603	-7.1880
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.993	F = 1951.124	CRDW = 2.070
PP (t) = -6.969	PP (Z) = -62.099	Park's J1(0,3) = 2.326

The coefficient on real deposit rate suggests that a one per cent increase in the interest rate can bring about an increase of the same magnitude in

<sup>3</sup> Note that the reserve requirement was reduced from 15 per cent of total current liabilities to 2 per cent of third parties liabilities on October 1988.

demand for rupiah deposits. The increase in the deposit holdings may be generated partly from the reduction in holdings of other financial assets such as reserve money and bonds.

The estimated coefficient relating to the bond rate indicates that a one per cent increase in the bond rate would reduce the demand for rupiah deposits by about 0.2 per cent. The low value of this coefficient and its t-ratio suggests that bonds are imperfect substitutes for rupiah deposits, and thus the assumption imposed in the model is confirmed by this finding. In other words, the traditional view that financial markets can be analysed as two groups, money and bond market is not supported by this finding. Therefore, a three financial asset market approach as assumed by this model is more appropriate.

Since three financial assets are considered, according to Walras law, it is only necessary to determine equilibrium condition in two assets markets. Technically speaking, it is sufficient to estimate equations regarding reserve money and deposit markets in order to analyse overall equilibrium in the financial market. In other words, it is not necessary to estimate equations regarding the determinants of demand for, and supply of, bonds.

The estimated coefficient on the real dollar deposit rate suggests that a one per cent increase in the dollar rate would reduce demand for rupiah deposits by only about 0.1 per cent. This also means that the two deposits are not perfect substitute for each other. As noted earlier, not all bank customers have access to foreign exchange denominated deposits, preventing them from holding such deposits even if the yields become more attractive.

The expansion in bank branch networks seems to induce higher demand for deposits. A one per cent increase in the number of bank branches, on average, leads to a 0.01 per cent increase in the demand for rupiah denominated deposits.

The increase in required reserves tends to reduce bank profitability and therefore depress interest rates on deposits, leading to a reduction in deposit holdings. In line with this expectation, the coefficient on the dummy variable

is negative. Therefore, the reserve requirement can be used as a policy instrument to affect banking activities.

### Demand for real foreign exchange deposits

In the following regression, real foreign exchange deposits are treated as a dependent variable while the independent variables are the same as for the demand for rupiah deposits. The estimated results are presented in Table 8.4. Various cointegration tests suggest the presence of cointegration characterising the demand for foreign exchange deposits.

The elasticity of the demand for foreign exchange deposits with respect to real GDP is about 1.6, suggesting that deposits tend to grow faster than GDP. Caution should be used since GDP is denominated in domestic currency, while this deposit is denominated in US dollars.

**Table 8.4.** *The demand for real foreign exchange deposits*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	1.6396	11.3514
Real rupiah deposit rate	-0.2200	-0.5610
Real bond rate	-0.4800	-1.6470
Real dollar deposit rate	2.5000	2.4853
Log of number of bank branch	0.0068	1.5695
Dummy of reserve requirement	-0.1336	-1.8482
Constant	-7.3903	-15.5220
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.950	F = 193.848	CRDW = 1.225
PP (t) = -4.910	PP (Z) = -31.386	Park's J1(0,3) = 4.282

The coefficient attached to the real rupiah deposit rate is statistically insignificant. This suggests that the demand for real foreign exchange deposits is relatively unaffected by the rupiah deposit rate. One explanation could be

that the holders of foreign exchange deposits maintain these deposits fixed, regardless of rupiah deposit rates, in order to avoid unexpected devaluation. In other words, the deposits are held for precautionary purposes, or to reduce exchange rate risk. Note that, from observations on published interest rates being offered from a number of banks from mid 1996 to mid 1997, the interest rate differential between the rupiah and dollar rate was about 7 to 8 per cent. Meanwhile, the depreciation of the currency was about 4 to 5 per cent a year. Thus, there is strong evidence of a 'peso problem': depositors are reluctant to reduce dollar deposits, although home currency deposits offer more attractive income, like it is the case in many Latin American countries. Note that, unlike rupiah deposit holders, all holders of foreign exchange deposits have free access to rupiah denominated deposits.

The coefficient attached to the real bond rate is negative. The low value of the coefficient suggests that bonds are not a perfect substitute for foreign exchange deposits. But, unlike the coefficient on the rupiah deposit rate, its t-ratio is only significant at 20 per cent level. If foreign exchange deposits are purely maintained to avoid an exchange rate risk, they must also be unaffected by the bond rate. Because a 20 per cent significance level is relatively low, the coefficient may be treated as insignificant. Therefore the 'peso problem' holds. Alternatively, it may be interpreted that some portion of foreign exchange deposits may be ready to be converted to rupiah denominated bonds with short maturity, say below one month, in a hit and run manner. Note that time deposits have at least one-month maturity, and therefore provide less flexible conversion of assets.

The coefficient attached to the dollar deposit rate is positive and suggests that a one per cent increase in the rate can induce about a 2.5 per cent increase in dollar deposit holdings. Since the LIBOR dollar rate is used as a proxy for the dollar rate offered by domestic banks, this result also implicitly suggests that the dollar rate is affected by the LIBOR rate. In other words, foreign exchange deposits are offered by domestic banks in order to attract deposits that would have otherwise been invested abroad.

The coefficients attached to the number of bank branches and the dummy of required reserves on demand for foreign exchange deposits are smaller in magnitude than those observed in regression for the demands for rupiah deposits. This implies that the impact of PAKTO is less pronounced in the demand for foreign exchange deposits. In other words, expansion in banking networks had more impact on deposit mobilization in the remote or less urban areas. Alternatively, the sources of growth for banks comes from depositors who are not aware of foreign exchange risk or do not have access to foreign exchange deposits.

### 8.3.2 Demand for bank loans

To shed light on the determinants of demand for real bank loans, a cointegrating regression is carried out with real bank loans as the dependent variable. The explanatory variables are real lending rate, real bond rate, and real GDP. As for the demands for deposits the dummy variable and the number of bank branches are also included.

The results of cointegrating regression are presented in Table 8.5. All cointegration tests strongly support a stable relationship between demand for bank loans and the explanatory variables.

**Table 8.5.** *The demand for real bank loans*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	3.4684	16.3201
Real lending rate	-1.0600	1.9576
Real bond rate	0.0600	0.0657
Log of number of bank branch	0.0216	3.3033
Dummy of reserve requirement	-0.4316	-4.0404
Constant	-9.8065	-8.3490
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.9811	F = 261.454	CRDW = 1.667
PP (t) = -6.711	PP (Z) = -57.918	Park's J1(0,3) = 7.098

The results suggest a stable relationship between real GDP and demand for real bank loans. One per cent increase in real GDP will generate a 3.5 per cent increase in demand for bank loans. This is consistent with the notion discussed earlier that there is a tendency for firms to become more leveraged by banks. In other words, the ratio of bank loans to GDP tends to increase over time.

The estimated coefficient suggests that a one per cent increase in the real loan rate will be followed by a 1.1 per cent reduction in demand for loans. Some projects which were previously marginally bankable may choose not to apply for loans, therefore reducing the demand. Moreover, projects with a higher return may also reduce external financing, as the higher cost of capital tends to reduce profitability.

The estimated coefficient on the real bond rate is relatively small and insignificant. This confirms the assumption that bonds are not perfect substitutes for bank loans. This has great relevance for policy purposes, in that firms are generally credit constrained, as they cannot shift from one financial source to the other. In other words, there is a strong segmentation of financial markets and therefore the authorities can design instruments specifically affecting each.

## **8.4. Money Market**

### **8.4.1. Demand for reserve money**

To shed light on the determinants of demand for reserve money, a cointegrating regression is employed, with real reserve money as the dependent variable. The explanatory variables used in the estimation are real GDP, real deposit rates and real bond rates. The latter two variables capture the opportunity cost of holding money. Real money and real GDP are expressed in log terms. A dummy variable representing the change in reserve requirement and the number of bank branches are included in the regression. All variables are transformed into

log forms, except for interest rates which are stated in proportionate form and, of course, the dummy variables.

The regression results are reported in Table 8.6. The Phillips-Perron non-parametric test confirms that the error term is stationary. This is also supported by the CRDW test and the J1 Park's test. In summary, the regression results support the view that there is a stable relationship between demand for real reserve money and real GDP, real deposit rates, real bond rates, number of bank branches and the dummy variable.

**Table 8.6.** *The demand for reserve money, 1984:Q1-1997:Q2*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	1.0090	18.3957
Real deposit rate	-0.5400	-1.8714
Real bond rate	0.1800	4.2771
Log of number of bank branch	-0.0106	-4.4629
Dummy of required reserves	0.2119	5.4731
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.924	F = 123.852	CRDW = 1.948
PP (t) = -7.329	PP (Z) = -51.997	Park's J1(0,3) = 4.425

The result suggests that the elasticity of demand for reserve money with respect to GDP is very close to one, which means money holding will increase proportionally with the increase in GDP. It seems that the demand for money is driven predominantly by the transaction motive.

The results suggest that a one per cent increase in the deposit rate will reduce the demand for reserve money by about 0.54 per cent. Reserve money is a non-interest bearing financial asset. Therefore, an increase in the deposit rate would induce higher opportunity costs. An increase in the deposit rate reduces the demand for real money.



As for the deposit rate, the model expects the coefficient on the real bond rate to be negative, meaning that an increase in this rate will increase the demand for bonds and will thereby reduce demand for other financial assets, including reserve money. Surprisingly, the estimated coefficient is positive and significant, although the magnitude is relatively small at 0.18.

The liberalisation in 1988 increased the number of banks and bank branches, and therefore should have an impact on the composition of financial assets held. This development can increase people's access to banks in terms of intermediation of savings and investment, as well as in terms of intermediation of commercial transactions. Therefore, it is expected that the increase in the number of branches will reduce the need to hold reserve money, as the function of money both as storage of values and conduits of transaction can be better replaced by banking services. In other words, the coefficient on the number of bank branches is expected to be negative. As expected, the estimated coefficient is in fact negative and suggests that a one per cent increase in the number of bank branches tends to reduce the demand for reserve money by 0.016 per cent. It seems that improvement in access to banks can increase transactions intermediated by banks, and thereby reduce the function of reserve money. In other words, the economy becomes less money intensive and more bank intensive. However, the magnitude of the coefficient is relatively small, indicating that bank services are not perfect substitutes for money. This is consistent with the finding discussed in section 3.5.3 that there was a small drop in the ratio of reserve money to GDP after the PAKTO, and this ratio stabilised thereafter (see Figure 3.3).

Increase in banks' reserve requirement should increase the demand for reserve money, as banks are forced to hold more reserves and, more importantly, banks may have to lower deposit rates. Note that, based on the previous finding, a lower deposit rate can increase reserve money demand, as the opportunity cost of holding money becomes lower. Therefore, the expected coefficient on the dummy variable is positive. The regression result is consistent with this hypothesis.

### **8.4.2. Bank Bail Out**

The change in reserve money supply can be decomposed into two parts, the change in net domestic assets (NDA) and net foreign assets (NFA). In this sub-section, the largest component of NDA will be discussed, namely bank bail out. Note that the term bail out is broadly defined as commercial borrowing from the central bank. During the pre-crisis period, it partly reflects the size of liquidity assistance from the central bank to troubled banks. It also includes "credit programs" sponsored by the central bank with a subsidised interest rate, such as small-scale credit schemes and credit to preferred projects like the national car project. However, as argued by Nasution (1995), these schemes tended to be associated with poor loan quality and induced banking fragility. Therefore, it might be a good proxy variable for measuring the "fragility" of domestic banks.

The main focus of this sub-section is to identify the determinants of the demand for bank bail out. In order to facilitate this, a cointegrating regression is employed with the bail out as a dependent variable. The bail out is measured in real terms, that is borrowing from the central bank deflated by the consumer price index. Four explanatory variables are included in the estimation, namely real lending rate, real exchange rate, real GDP and a dummy variable representing banking liberalisation. As usual, all variables are transformed into log form, except the real interest rate and dummy variable.

The estimation results are presented in Table 8.7. All cointegration tests suggest a stable relationship between the real bail out and real lending rate, real exchange rate, and real GDP. This suggests that borrowings from the central bank may indeed reflect the fragility of the banking system.

The results for the real lending rate variable implies that an increase in the interest rate deteriorates bank performance and therefore induce a higher demand for bail out. A one per cent increase in the real lending rate can increase the demand for bail out by 1.2 per cent. This implies that, following a monetary tightening, banks may experience higher non-performing loans. As argued by Stiglitz and Weiss (1981), this deterioration in the asset quality may

come from two factors. First, low yielding but safer projects may not be able to honour the loan. Second, the loan portfolio will be dominated by risky projects, which can eventually lead to a higher default risk.

**Table 8.7.** *The demand for real bail out*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	-0.3965	-4.2432
Real lending rate	1.2011	2.5649
Log of real exchange rate	0.9665	4.3798
Liberalisation dummy	0.1131	2.0630
Constant	0.0511	0.2739
<i>Statistical Properties</i>		
$R^2 = 0.944$	$F = 170.892$	$CRDW = 1.574$
$PP(t) = -4.841$	$PP(Z) = -32.448$	$Park's J1(0,3) = 1.319$

Since a hike in the interest rate can induce a higher demand for bail out, the increase in liquidity injection to banks tends to jeopardise the purpose of monetary tightening. Thus there will be a need to counter balance the injection. One method of doing this is through the release of foreign reserves. In other words, quite contrary to the conventional wisdom, an interest rate hike can precipitate capital outflows. The other method is by counter balancing the injection with other components of NDA, such as the sale of domestic securities held by the central bank.

The coefficient on the real exchange rate is positive and close to one, suggesting that a bail out is also highly responsive to changes in the real exchange rate. Currency devaluation seems to worsen the balance sheet of banks. Devaluation would become a problem if there were a currency mismatch problem, either on the part of banks or firms. As shown in Chapter 5, banks do not possess such a mismatch in the sense that assets and liabilities denominated in foreign currency are well balanced. Thus the problem should be on the part of firms. In other words, banks are exposed to

an indirect currency risk. This issue will be discussed in detail later in Chapter 9.

Comparing the magnitudes of the coefficients on the real interest rate and real exchange rate may be of interest for policy purposes. As discussed in Chapter 6, in the wake of speculative attacks, policy makers are confronted with two hard choices; defending the currency by increasing the domestic interest rates or allowing the currency to devalue. The finding here suggests an interest rate hike would be more costly for the banking sector. In the case of an interest rate hike, all firms will be affected. On the other hand, only firms operating in the non-tradable sector with a currency mismatch will be hit hard by devaluation. This is probably the reason why bank borrowing with the central bank is more sensitive to interest rates than to a real devaluation.

The coefficient attached to real GDP suggests a negative relationship between bank bail out and GDP. A one per cent decline in real GDP can cause a 0.4 per cent increase in real bank bail out. In other words, a negative shock in domestic output can worsen the financial position of banks. Therefore, a shock in real activities can affect the financial sector.

The coefficient on the dummy variable is positive and significant but relatively small. Thus, it may be interpreted that following the liberalisation in 1988, the banking sector became marginally more fragile. The possible trade-off between efficiency and safety resulting from liberalisation has been a main concern in the literature applying industrial organisation theory to financial sector analysis (see for example Davies 1991). However, the finding here suggests that the increase in fragility of the banking sector is relatively small.

Finally, we have shown that the bail out function assumed in the model is supported by the data. Thus, ignoring this factor as one of the determinant of money supply can seriously jeopardise the ability of the model to replicate the actual macroeconomic conditions. Thus, the traditional IS-LM modelling approach can be taken for granted. Indeed, the introduction of the bail out function is a means to revise the traditional approach.

## **8.5. Balance of payments**

### **8.5.1. Trade functions**

The economy is linked with the rest of the world through trade and capital movement. In this subsection, import and export functions will be estimated. Capital transaction will be discussed in the next subsection.

The export function represents non-oil export only. Oil exports are excluded since they are primarily determined exogenously through quota by OPEC.<sup>4</sup> We used a 'reduced' form export equation with world income, real exchange rate, and export supply capacity as the explanatory variables.<sup>5</sup>

The results are reported in Table 8.8. Note that the coefficient of the world income variable is statistically insignificant. A nested test done on this variable also suggested that it does not add to the explanatory power of the regression over and above the other two variables. This result is consistent with the findings of the recent literature on the determinants of trade flows, which suggests that exports from developing countries are supply, rather than demand, determined.<sup>6</sup> World income was therefore omitted in the final estimation.

The final results are shown in Table 8.9. It is worth mentioning that the restricted regression improves statistical properties of the estimated coefficients as shown by stronger t-ratios.

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<sup>4</sup> When oil exports are included, the estimation result is very unsatisfactory. It appears that total real exports are negatively related to the real exchange rate and world GDP.

<sup>5</sup> World income is measured as trade-weighted GDP of OECD countries. For the export supply capacity, manufacturing production index is used as a proxy.

<sup>6</sup> See for instance, Athukorala and Riedel (1996) and the works cited therein.

**Table 8.8.** *The non-oil export function (unrestricted regression)*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real exchange rate	0.9943	2.4406
Log of world GDP	1.2586	0.8188
Log of capacity index	0.9221	3.5905
Constant	-0.0174	-0.0670
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.961	F = 441.006	CRDW = 1.976
PP (t) = -7.394	PP (Z) = -55.102	Park's J1(0,3) = 7.194

**Table 8.9.** *The non-oil export function (restricted regression)*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real exchange rate	1.3281	5.0304
Log of capacity index	1.1196	15.8520
Constant	-0.1025	-2.4419
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.967	F = 813.117	CRDW = 1.899
PP (t) = 6.408	PP (Z) = 49.439	Park's J1(0,3) = 6.003

The elasticity of non-oil exports with respect to the real exchange rate is 1.32, suggesting that non-oil export is elastic with respect to devaluation. Since oil exports are exogenously determined by OPEC, following a real devaluation the improvement in total export will be solely determined by non-oil exports.

The coefficient attached to the capacity index suggests that a one per cent increase in capacity leads to 1.12 per cent in export volume. This means that the removal of domestic obstacles hampering production and investment can improve export. In other words, competition policies are critical for export development.

The other factor influencing trade balance is the demand for imports, which is a function of real domestic GDP and real exchange rate. The regression results for demand for imports are presented in Table 8.10. All cointegration tests consistently support the stability of the function characterising demand for imports. Moreover, all coefficients are significant.

The elasticity of total imports with respect to domestic GDP is bigger than one, suggesting that total imports are responsive to changes in GDP. A one per cent increase in real GDP will increase imports by 1.2 per cent.

The coefficient attached to the real exchange rate is negative, and thus a real devaluation will reduce imports. There are three channels that may explain the decline in imports. First, devaluation increases the domestic price of imported goods, leading to substitution of imported goods by domestic goods. Second, devaluation reduces real income, leading to overall compression in domestic absorption. Third, devaluation increases the foreign debt burden, causing a decline in investment.

**Table 8.10.** *The import demand function*

<i>Explanatory Variables</i>	<i>Coefficient</i>	<i>T-ratio</i>
Log of real GDP	1.2181	16.1043
Log of real exchange rate	-1.8857	-11.4592
Constant	0.0849	2.5490
<i>Statistical Properties</i>		
R <sup>2</sup> = 0.983	F = 1584.052	CRDW = 1.763
PP (t) = -6.373	PP (Z) = -52.155	Park's J1(0,3) = 4.747

Based on the estimates on the cointegrating vectors, the Marshall-Lerners condition can be derived directly. In order to have a balance of trade improvement following a devaluation, the condition requires that the sum of the absolute value of the elasticity of imports and exports with respect to the real exchange rate should be bigger than one. Because, the export function does not incorporate oil exports, it will be assumed that oil exports are not affected

by the change in real exchange rate. Even if the elasticity of non-oil export is not considered, according to the results, the Marshal-Lerners condition is satisfied for Indonesia. Therefore, there is convincing evidence that the trade balance will improve following a real devaluation. However, since the elasticity of imports is bigger than that of exports, the improvement would come mainly from an import compression.

### **8.5.2. Capital flows**

The determinants of capital flows will be estimated in this subsection. Note that the model in Chapter 6 suggests that capital inflow is a function of the interest rate differential between domestic and international markets. Since the domestic financial market is bank dominated, an average of the bank-lending rate is used to represent the domestic interest rate. The corresponding international interest rate used is the average LIBOR borrowing rate.

There is a large body of literature suggesting that capital flows are a regional phenomena, in the sense that countries in a particular region tend to experience a similar pattern of capital influx (see for example World Bank 1995, among others). Capital inflows started to flood in to the South East Asian region from 1989 (Lopez-Meija, 1998). In order to incorporate the regional effect, total net private capital inflows to the region are included as an additional explanatory variable. This variable is called regional private capital flows. The Philippines and Thailand are chosen to represent the region. Malaysia is excluded due to lack of quarterly data. Singapore is also excluded, because of its peculiarity as a financial centre.

Government capital flows are not included, since they are determined exogenously by negotiations with donor countries. Hence, the estimates deal only with private capital movement. Including government capital flows was attempted, but the coefficient on interest rate differentials is negative.

Unlike other regressions, all variables are maintained in their original forms. Because some of the observations are negative, logarithmic



transformation is not possible. The results of the regression are presented in Table 8.11. All cointegration tests strongly support the conclusion that the error term is stationary. Moreover, the estimated coefficients are highly significant.

It should be noted that the 'goodness of fit' of the model is modest, as indicated by the value of  $R^2$ . However, the residual stationarity is supported by CRDW, J1, and PP tests. Thus the coefficients can be interpreted as long-term elasticities.

**Table 8.11.** *Determinants of private capital flows*

<i>Explanatory variables</i>	<i>Coefficient</i>	<i>T-ratio</i>	<i>Elasticity</i>
Interest rate differential	21.6730	2.2630	2.2149
Regional private capital flows	0.7511	7.4860	0.6731
<i>Statistical properties</i>			
$R^2 = 0.6818$	F-test = 71.5800	CRDW = 1.5359	
PP (Z) = -46.5280	PP (t) = -5.8383	J1(0,3) = 0.5586	

The estimated coefficient on regional private capital flow is positive and highly significant, suggesting that Indonesia and other countries in the region share common trends in capital flows. Foreign investors may perceive these countries as sharing similar investment opportunity, risk and return. If this is true, each country is exposed to possible regional contagion caused by a shift in perception on the part of investors regarding the regional investment risk.

The coefficient attached to the interest rate differential is positive and suggests that a one per cent increase in the interest differential would increase capital inflow by 2.2 per cent. Though this seems to suggest that capital flows are relatively responsive to interest differentials, this is far from suggesting perfect capital mobility. The result is quite surprising, since Indonesia is well known for its long established open capital account regime. There are two possible explanations.

First, as discussed in Chapter 3, in Indonesia capital outflows are not restricted, although some restrictions on capital inflows are in place. The period included in the estimation mostly represents positive net capital inflow, and that this net inflow could have been bigger if the restrictions were abandoned. In other words, these restrictions may have prevented a larger capital inflow response to the change in interest differential. Thus, if capital inflows were not restricted the estimated coefficient should have been bigger.

Second, the interest rate differential is not corrected for risk premium, and, thus, the 'true coefficient' is under estimated. Because the premium is difficult to estimate, it is assumed constant. This suggests that our estimates should be interpreted with caution. Further refinement is needed, and this is left for further research.

## ***8.6. Implications for policies and macroeconomic adjustment***

So far, the econometric estimation has provided rich information regarding the interrelationships between macroeconomic variables. Few variables are insignificant and one coefficient has an unexpected sign (i.e. the coefficient of real bond rate in the demand for reserve money equation). Nevertheless, the overall performance of the model seems satisfactory in terms of facilitating a rigorous quantitative analysis regarding macroeconomic relations during the pre crisis period.

It should be noted from the outset that the estimated coefficients presented in this chapter are the long-run coefficients representing stable relationships among the variables in question. The dynamic short-run analysis will be discussed in Chapters 9 and 10 by using impulse response analysis. This subsection addresses the possible impact of certain policy scenarios during the crisis period inferred from the long-run coefficients. Moreover, in order to avoid repetition, the analysis presented here will be qualitative in nature, just to give a sense that the estimates are relevant for explaining the crisis.

There are two possible policy responses to an unexpected reversal of capital inflows, with different implications for the macroeconomic adjustment process. Suppose there is an unexpected shift in perception about country risk on the part of investors. Investors will require a higher domestic interest rate to offset that risk. If the domestic interest rate is not increased, there will be a capital inflow reversal or even capital outflows, which can then trigger currency and balance of payment crises. The question would be: which policy response is feasible?

### **8.6.1. Interest rate hike**

The main purpose of an interest hike in a crisis context is to prevent the collapse of the currency and deterioration in the balance of payments. There are three methods of adjusting domestic interest rates while fixing the currency. First, the authorities can proactively stimulate an increase in the domestic interest rate by increasing the rates on government bonds or central bank certificates. The money supply will contract and, therefore, private interest rates will rise as well. Second, if the authorities do nothing, capital outflows will trigger an increase in domestic interest rates, since the outflows reduce loanable funds in the credit market. Third, the central bank can directly reduce money supply by selling reserves and/or net other assets (NOA). The adjustment process implied by these three strategies will be similar, since they result in an interest rate hike. What will happen to the economy?

First, domestic absorption, in particular investment, will decline. Note that investment is more responsive than consumption to the change in interest rate. Because absorption falls, imports will decline, inducing an improvement in the trade balance. Thus, capital outflows are financed by an implosion in domestic absorption.

A qualification should be made regarding how fast investment will adjust to an interest rate hike. If it adjusts slowly, interest rates will need to overshoot in the very short run to prevent larger capital outflows. This will be discussed further in Chapter 9.

Second, an interest rate hike will increase the demand for bail out as it leads to higher non-performing loans. Since the central bank functions as a lender of the last resort, it has to help out the domestic banks. However, this means the central bank may lose control over the money supply as the supply is now endogenously determined. Controlling the money supply by fixing the NDA would require a further increase in the interest rate, inducing further problems for the banking sector. If this problem is known by speculators, they will further intensify speculative attacks on the currency as the probability of successful attacks becomes larger under a weaker banking sector. To avoid this problem, the authorities have to reduce the NFA to accommodate the increase in the NDA. However, this can lead to a typical first generation balance of payments crisis. Therefore, the central bank may face an impossible task: the moment a monetary austerity measure is taken, it may have to be reversed as it weakens the domestic banks. The problem is that interest rate hike is not consistent with the possible monetary expansion implied by increasing need to bail out banks.

### **8.6.2. Real devaluation**

The alternative adjustment process to accommodate capital outflows is through a real devaluation. Since the Marshall-Lerner condition is satisfied, it is possible to offset capital outflows by improving the trade balance through a real devaluation. As discussed, an improvement in the trade balance will mainly come from an import implosion, since imports are more sensitive than exports to a change in the real exchange rate.

However, a qualification should be made regarding the speed of adjustment of the trade balance to a devaluation. If the improvement in the trade balance is instantaneous, the overall positive impact of the devaluation will be gained quickly. However, if the trade balance adjustment is sluggish, the exchange rate will overshoot. In order to avoid overshooting, the authority will have to be willing to intervene in the exchange market by selling foreign reserves. This issue will be discussed further in Chapter 10.

# **Chapter 9**

## ***The Onset of the Crisis***

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### **9.1. Introduction**

This chapter argues that two problems stand out in the run up to the crisis, namely balance of payments and banking sector problems. The former determined the severity of the exchange market pressure, while the second made it difficult for the authorities to defend the exchange rate. Therefore, the country was vulnerable to the twin crises.

The rapid build up and changing structure of foreign debts, and the surge of short-term capital inflows over several years in the lead-up to the crisis can be interpreted as a process of breeding problems that made the country more susceptible to a sudden capital outflow. As discussed in Chapter 3, total foreign debts increased from 26 per cent of GDP in 1982 to 57 per cent in 1996. Moreover, private and short-term debts became more dominant. The way the current account deficits was financed also changed, from long-term official sources in the 1980s to a much higher proportion of short-term private sources by the 1990s.

However, a susceptible balance of payments is only a necessary condition for the crisis to happen. The sufficient condition is that there should be significant forces on the domestic front constraining policy responses from being effective and credible. It will be shown that a weak banking sector is the sufficient condition. That the banking sector was vulnerable to a financial crisis was shown in detail in Chapter 5. As shown by the model developed in Chapter 6, a sharp rise in the interest rate can further complicate an already defunct banking sector, making the likelihood of a successful attack higher. In this chapter, such implications will be further analysed in the context of macroeconomic vulnerability at the onset of the crisis.

The structure of this chapter is as follows. Section 9.2 sheds lights on the chronology of the *initial crisis*, covering the period from 1 July to 31 October 1997. The purpose of this section is to identify sequence of events and policy responses in order to set the scene for further analysis in the subsequent sections.

In section 9.3, it will be argued that the balance of payments was vulnerable to capital inflow reversal, in that the drying up of international liquidity would make it difficult to service foreign liabilities. Several factors that contributed to this problem will be highlighted, such as the build up of current foreign liabilities and unhedged foreign debts.

Section 9.4 highlights the extent of pressure in the foreign exchange market by employing a market pressure index. In addition, the issue of contagion and the crisis trigger will also be discussed.

Section 9.5 analyses the extent of capital inflow reversal as one of the problems contributing to the balance of payments crisis. Impulse response functions are used to trace the factors triggering the reversal.

The ineffectiveness of an interest rate hike is discussed in section 9.6. Using an impulse response function, it will be shown that an exceptional rise in the interest rate could lead to a weaker banking system. Because of this, the interest rate hike was not credible in deterring foreign exchange attacks.

## **9.2. Chronology of the *initial crisis***

This section highlights the events and policy responses that occurred in the first round of the crisis, between July and October 1997. This period has several distinctive features compared with the period following the closure of 16 private banks (1 November 1997). Policy responses initially followed the standard textbook style, which included widening the intervention band, floating the exchange rate, increasing the interest rates and tightening fiscal and monetary stances. However, after November 1997, policy responses were less certain and tended to complicate the situation. Because of large credit creation needed to

support troubled banks and firms, money supply was not properly controlled. Moreover, the hesitancy in implementing the IMF supported reform packages may have sent confusing signals to the market.

The socio-political environment remained manageable in the run up to the crisis, with President Suharto seeming to have a strong grip on the country. Student protests in several cities were apparently under control. In the latter period (post November 1997), political issues made the country more volatile. A number of events occurred, most notably deterioration of the President's health, the appointment of Dr. Habibie as Vice President, larger and more frequent student protests, ethnic violence against Chinese community, the CBS fiasco, the appointment of President Suharto's family member and cronies in cabinet, and, finally his decision to step down. The social and political upheaval that went hand in hand with the economic distress made the calamity of the crisis unprecedented and tragic.

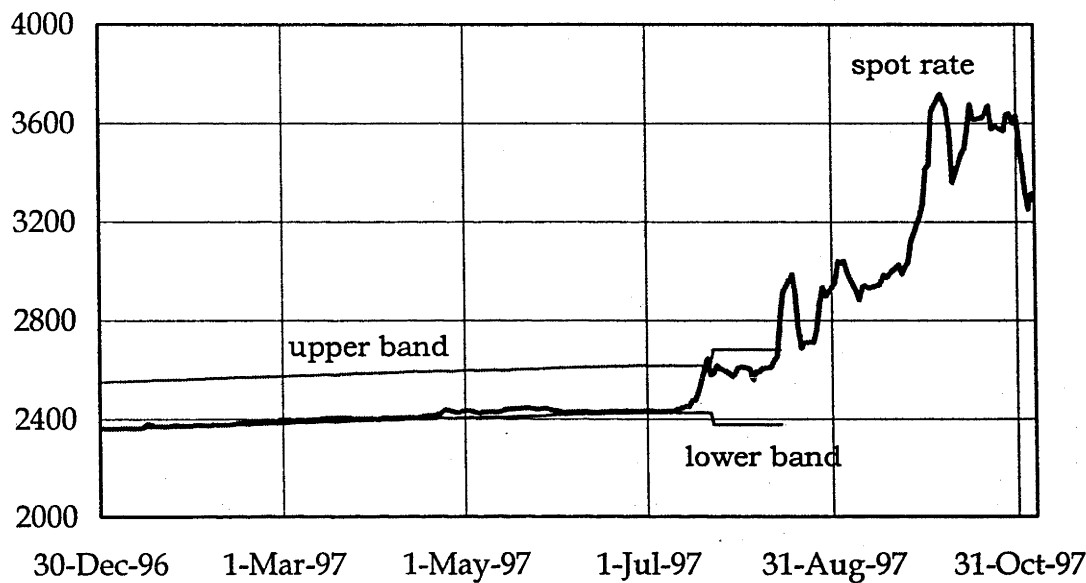
The Asian crisis formally began in Thailand on 2 July 1997. The baht was floated and currency speculation swiftly hit the region. Every country in the region was tested. Malaysia and the Philippines were amongst the first to experience speculative pressure, quickly followed by Indonesia and South Korea. Even the two financial centres, Hong Kong and Singapore, were attacked.

On 12 July, as a precautionary measure, BI widened the intervention band from 8% to 12%. At that time, there was a tendency for the rupiah to move toward the upper band, i.e. to depreciate. Before the collapse of the baht, the exchange rate tended to move toward the lower band (see Figure 9.1). The difficulties in maintaining the crawling peg came to a head on 21 July when the exchange rate fell from Rp 2,540 to Rp 2,700 within a few hours. This pushed the authorities to step into the forward market by pouring \$500 million to stabilize the currency. This caused the rupiah to strengthen temporarily to around Rp 2,600 during the last week of that month.

However, the problem was far from over, and the rupiah began to slide down again in the first week of August. By the second week, the upper band

had already been crossed. A further intervention was made, pouring another \$500 million into the forward market on August 13, but this time the exchange rate stubbornly continued to depreciate.

**Figure 9.1.** *Foreign Exchange Rate, Rp/\$*



Source: adapted from McLeod (1997).

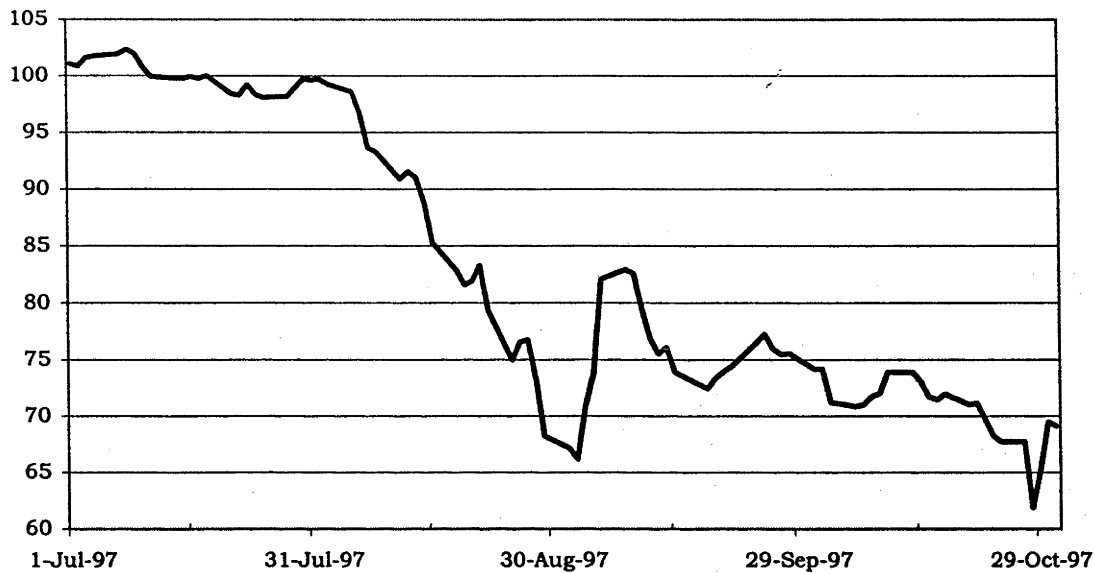
The failure of the intervention led the authorities to reassess the strategy. As has been shown by the Thai and Malaysian experience, currency intervention in the forward and spot markets was not effective in deterring speculative attacks. On August 14, the government finally abandoned the peg and let the market determine the value of the currency. Moreover, to accompany the float and to avoid exchange rate overshooting, the authorities announced the intention to tighten monetary conditions by increasing interest rates and reducing the central bank's purchase of SBPUs.

The free float was widely acclaimed by both Indonesian economists and the international community. The IMF deputy managing director, Stanley Fischer, said a float regime would enhance the monetary stance, which was



aimed at sustaining high growth (*Jakarta Post*, 16 August 1997; cf. Lindblad, 1997).

**Figure 9.2.** *The Jakarta Stock Price Index, July-October 1997 (July 1997 =100)*



Source: Jakarta Stock Exchange

Nevertheless, market reaction was negative. On August 15, the exchange rate touched Rp 2,900 and the stock market slid to 617 from over 700 at the beginning of the month. This indicated that both debtors exposed to unhedged foreign currency denominated liabilities, and foreign investors holding domestic assets, were nervous. Foreign investors held about 30 per cent of domestic stocks in the Jakarta Stock Exchange (JSE) at that time. The sale of liquid equities by foreign investors may have contributed to the persistent fall in the stock market index since the first week of August. The long-standing stability of the value of the rupiah made hedging seemingly unnecessary. The float meant debtors were exposed to a higher exchange risk, as the authorities could no longer guard the value of the rupiah. From an individual debtor perspective, it became necessary to reduce this risk by buying foreign exchange earlier in the forward market. However, the rush into the exchange market pushed the currency down further, creating the prospect of an even greater exchange loss.

On 16 August, in his annual "State of the Nation" address, the President stressed that tight monetary policy would be temporarily continued until the market calmed and the rupiah reached a new equilibrium. He also urged the business community to make a contribution by postponing low priority projects and finding safer and steadier ways of funding.

As part of the stabilization, the interest rate on SBI was increased from 15% to 30% on 19 August. State enterprises were requested to buy SBI, an instrument to reduce money supply, and the purchase of SBPU by Bank Indonesia was stopped temporarily. As a result, reserve money decreased from Rp 46 trillion in the previous month to Rp 33 trillion by the end of August. The interest rate on one-month deposits increased to 40%, on average, and for a few hours the overnight the JIBOR (Jakarta Inter Bank Offered Rate) rates touched 200% (Lindblad 1997).

The monetary tightening was not welcomed by the market. The exchange rate and stock market index strengthened from 19 to 21 August, but weakened again afterwards. The business community became concerned about the health of domestic banks and the availability of bank loans. The banking system began to face liquidity problems, and a fierce interest rate war developed amongst banks. On August 25, foreign banks increased deposit rates to 25 per cent. In response, domestic banks increased deposit rates to 30 per cent on the following day. Several banks had to increase their rates to in excess of 40 per cent. On 3 September, due to mounting pressure from the business community and the President, BI agreed to cut the SBI rates back to around 20 per cent and to cautiously relax the money supply.<sup>1</sup> However, this step did not prevent market rates from increasing. During September and October 1997,

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<sup>1</sup> Criticism of the tight money policy came mainly from the business community, and their criticism was widely echoed by the press. On various occasions during the last week of August and the first week of September, the President called for a speedy end to this policy without consulting the Governor of the central bank and Minister of Finance. The voice of the president was presented by State Secretary, Minister of Investment, Minister of Housing, and Coordinating Minister of Production and Distribution. This was a sign that the business lobby had affected the President. Later, the Governor complained that the President preferred to discuss monetary matters with other cabinet members than with him.

domestic banks suffered severe losses due to negative spreads. The weighted average of deposit rates was higher than that of lending rates.<sup>2</sup>

At that time, the exact adverse-impact of the interest rate hike on the banking system was not publicly known. The press only obtained the information that the central bank had been injecting liquidity of around \$500 million to several troubled banks at the end of August (*Kompas*, 28/8/97). However, the damage was very clear several months later when the data from BI published. Commercial banks' borrowing from the central bank had increased to Rp 19.4 trillion by the end of August from Rp 14.5 trillion in the previous month. During the following months, this liquidity injection continued to increase at a very alarming rate. During September, October, and November 1997, the borrowing was recorded to be about Rp 23.9 trillion, Rp 27.9 trillion, and Rp 33.2 trillion, respectively.

Soesastro and Basri (1998, p. 9) described the situation as:

An 'overshoot' in the interest rate rise, through tightening of liquidity by the Indonesian monetary authority, was perhaps responsible for the severe financial crisis that ensued. The tight money immediately exposed the country's weak financial and banking systems. Soon BI had to supply banks facing liquidity problems with funds to help them out.

In order to overcome the crisis, the government announced a reform package on 16 September. The objectives of the package were to stabilize the currency, reduce the current account deficit, consolidate the fiscal budget, and strengthen the banking and corporate sectors. These objectives were to be achieved through several measures, including gradually loosening the money supply; cutting SBI rates; reducing fuel subsidies; postponing several mega projects like the Jakarta Tower and Sumatra-Malaysia bridge; providing export incentives such as pre-shipment credits; and increasing the tax on consumer and luxury goods to cut imports. In order to strengthen the banking sector, the

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<sup>2</sup> By the end of August, several bankers had complained that their banks made losses because of negative spreads and new loans would not be able to be issued if the tight money was not ended quickly, as they had to retain more funds for paying higher interest rates on deposits (*Bisnis Indonesia*, 26 August 1997).

government announced that state banks would be merged, and insolvent private banks closed. This statement implicitly indicated that both state and private banks might have been adversely affected by the tight monetary policy.

Market reaction was not enthusiastic to the announcement of the reform package. Both the exchange rate and the stock market index continued to weaken. By the end of September, the exchange rate was about Rp 3,300 per dollar, or 30% depreciated from the July value. Domestic firms were reported to have difficulties in servicing foreign debts. Domestic banks and firms were downgraded by international rating agencies. Trade financing from foreign banks also became a problem. Foreign creditors' refusal to accept letters of credit issued by domestic banks was frequently being reported in the press.

The wild movement in the exchange rate created uncertainties regarding the future course of the economy. The government seemed powerless to combat the speculation. Pessimistic and confusing predictions worsened already weak business confidence. The press and domestic economists were not helping. McLeod (1997, p. 36) described this situation as:

[w]ildly pessimistic predictions abound, seemingly lacking any semblance of analytical rigor. The media seem only too ready to devote headlines to any 'expert' willing to outbid the previous most dire prediction for the exchange rate or the impact on Indonesia's economic growth.

On 8 October, the government finally decided to seek assistance from the IMF. The President seemed hesitant to call the IMF in. However, since his economic team was arguing that international assistance might restore confidence, he found no other way. Professor Widjojo Nitisastro, one of the economic architects of the Suharto regime, was assigned to lead negotiations with the IMF.

Ironically, positive market reaction to the announcement lasted only one day. On the following day the rupiah strengthened, but then steadily depreciated again, although this time the fluctuation of the exchange rate was not as sharp as before. This pattern continued until the first week of December.

After a marathon negotiation, the government finally reached agreement with the IMF on 31 October. It involved a surprisingly large \$43 billion rescue package, including \$5 billion from the liquidation of Indonesia's foreign assets. No detailed reform program was disclosed, however. A structural reform program was outlined as follows:

- Financial sector: reforming the banking system, and further developing the capital market. State banks would be merged, but no detailed information was provided as to which banks would be merged and when or how this would be done.
- Real sector: accelerating trade liberalization by reducing export taxes and import tariffs for chemical, metal and agricultural products. The national car project was to adhere to the decision made by the WTO.
- Monetary policy: in order to achieve exchange rate stability, a monthly target of money supply would be set in accordance with net foreign assets.
- Fiscal policy: in order to consolidate fiscal policy, off budget financing would be eliminated, including the financing of strategic industries and the reforestation program. Privatisation of state enterprises, including state banks, was to be accelerated.

Following the announcement of the rescue package, the rupiah improved to Rp 3,400/\$ but weakened again over the next few days. It was not clear whether the improvement was due to the announcement or to concerted intervention by Indonesia, Japan and Singapore. It was reported that Japan and Singapore had bought rupiah in the forward market to help Indonesia. Though stubbornly depreciating throughout November, the exchange rate did not fluctuate wildly.

Following a widespread bank run, the rupiah tended to behave wildly from the first week of December on. This matter will be discussed in detail in Chapter 10 (the propagation of the crisis).

### **9.3. Balance of payments vulnerability**

This section discusses the factors that can make the balance of payments susceptible to a currency crisis. Three problems stand out, namely the build up of foreign debts, reserve deficiency to cover liquid foreign liabilities, and currency mismatch.

#### **9.3.1. Foreign-debt service problem**

In 1996, Indonesia had the highest ratio of foreign debt to GDP compared with the other Asian crisis countries (see Figure 9.3). Perhaps, a good benchmark would be the Latin American countries that had experienced debt crisis in 1980s. With Malaysia as an exception, the East Asian crisis countries tended to have higher debt ratios compared with Argentina, Brazil, Chile, and Mexico. Based on this, there seemed reason to believe that the East Asian countries might have suffered some kind of vulnerability to a debt crisis. However, this should be interpreted very cautiously, because Indonesia's debt level was already high since the late 1980s, and yet the crisis did not occur at that time.<sup>3</sup>

Note that, except for the Chilean case, the Latin American debacle originated from the accumulation of government borrowing from foreign commercial banks and financial houses and the subsequent reluctance of these creditors to further extend loans.<sup>4</sup> A lesson can be learned from this experience: unlike foreign borrowing from bilateral or multilateral donors, borrowing from commercial creditors is subject to shifts in confidence. This may partly explain why Indonesia was not hit by the crisis in the late 1980's, when the debt to GDP and debt service to export ratios peaked.<sup>5</sup> At that time, the bulk of the debt was government debt and it was therefore easier to

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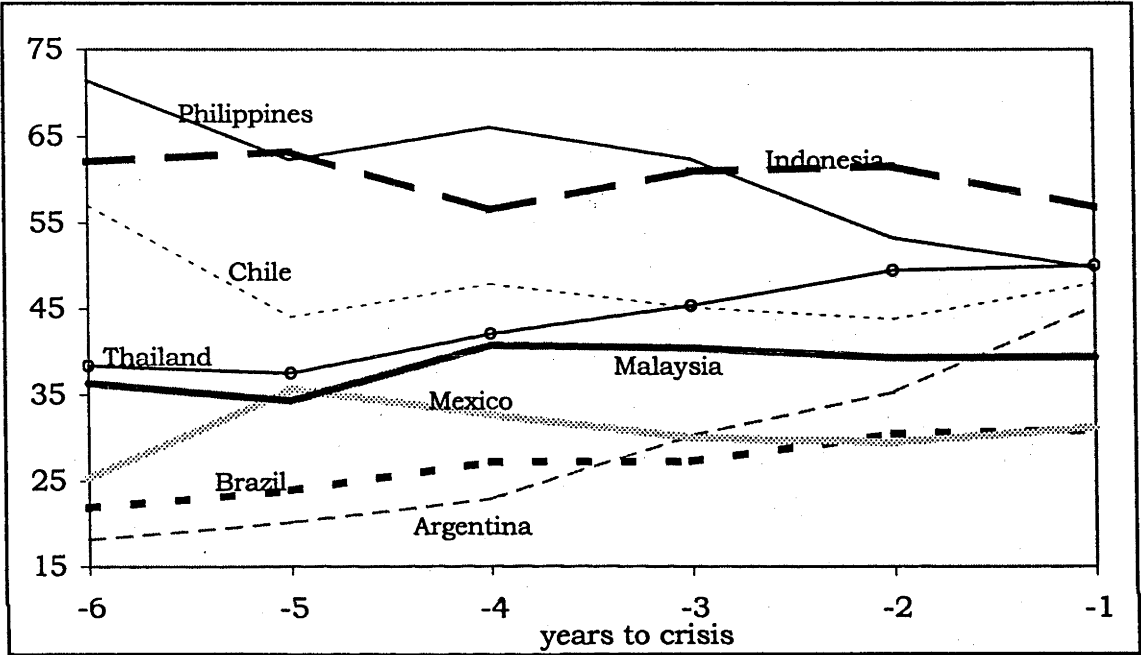
<sup>3</sup> Most empirical work to determine "sustainable debt" suggest a much higher debt to GDP ratio than was actually observed in developing countries. For instance, a macroeconomic simulation done by Blanchard (1986) indicated that a debt to GDP ratio about 60 per cent could be considered sustainable for Brazil.

<sup>4</sup> See Edwards (1995), among others.

<sup>5</sup> See Table 3.3 in section 3.3 (page 50)

negotiate for further extensions of the loans from the donor. Government commercial borrowings were relatively small. However, in the lead up to the Asian crisis, the proportion of private debt was already high and thus 'credit rationing' imposed by commercial creditors could destabilize the balance of payments.

**Figure 9.3.** *Total foreign debts to GDP ratio, (%)*



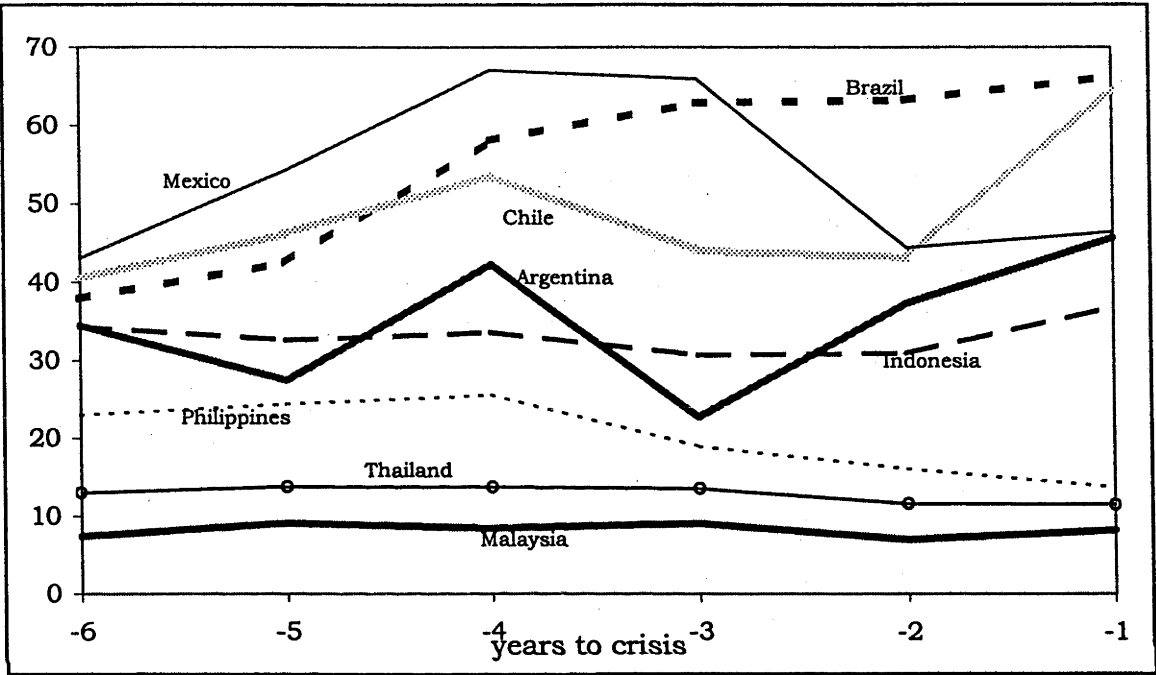
Source: World Bank, World Debt Tables.

Indonesia's debt service ratio (debt repayments and interest payments relative to total export) was higher than the other Asian countries but lower than the Latin American countries (see Figure 9.4). It is clear from the figure that, in the early 1980s, the Latin American countries had difficulties in servicing their debt, as indicated by the high ratio of debt service to export, especially Brazil. By contrast, the East Asian countries had a lower debt service ratio, despite the high foreign debt to GDP ratio. One of the reasons was that the Asian countries were much more export oriented.

Based on these two ratios, it can be concluded that Indonesia in 1996 was in a relatively better position than the Latin American countries, but was

relatively more vulnerable than the other Asian countries. Therefore, in the case of foreign capital inflows slackening, it was going to be more difficult for Indonesia to adjust the balance of payments compared to the other Asian countries.

**Figure 9.4.** *Debt service to export ratio (%)*



Source: World Bank, World Debt Tables.

**9.3.2. Liquid foreign liabilities**

An alternative way to measure balance of payments vulnerability is the ratio of liquid foreign liabilities to total foreign exchange reserves.<sup>6</sup> The idea is that in the case of a slow down in capital inflows, the excess demand of foreign exchange is more likely to be created by these liabilities, and if exchange rate depreciation is to be avoided this excess will need to be met by running down foreign exchange reserves. In this study, liquid foreign liabilities consist of

<sup>6</sup> This ratio has been used in Athukorala (1999) and Athukorala and Warr (1999).



current foreign liabilities and cumulative foreign portfolio investment. The current liabilities are defined as liabilities that are due within one year and consist of short-term debt and interest payments on foreign debt. Most portfolio inflows are in terms of investments in traded shares and bonds and therefore can be very liquid. Moreover, the dollar return on these investments will depend on the value of the exchange rate. Expectations of devaluation may precipitate panic sales of domestic shares and bonds.

**Table 9.1. Indonesia: Composition of Liquid Foreign Liabilities (\$ billion)**

	1990	1991	1992	1993	1994	1995	1996
Cumulative Portfolio Investment	0.5	0.5	0.4	2.2	6.1	10.2	15.2
Current Liabilities	21.6	26.0	30.5	32.1	33.7	42.4	53.7
Short-term debts (%)	54	56	59	56	58	61	60
Debt Service (%)	46	44	41	44	42	39	40
Total Liquid Liabilities	22.1	26.5	30.9	34.3	39.8	52.6	68.9
As % of foreign reserves	255	255	269	275	299	353	355

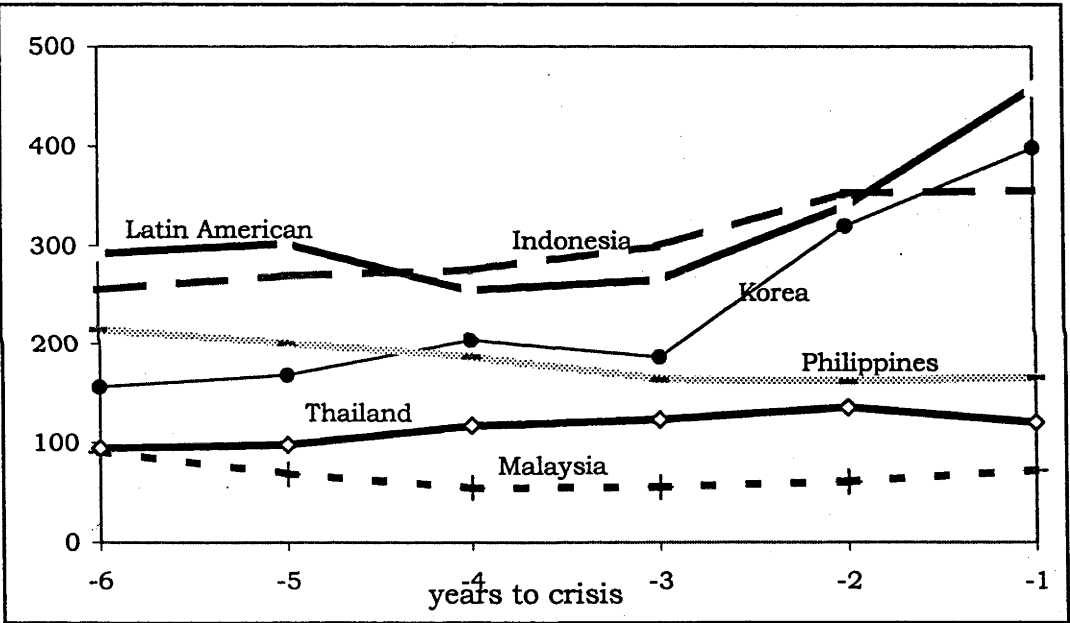
*Sources:* World Debt Tables and International Financial Statistics

Table 9.1 reports the composition of liquid foreign liabilities. The ratio of liquid foreign liabilities to total foreign exchange reserves showed an increasing trend during seven years prior to the crisis. The bulk of these liabilities came from short-term debts, and this indicates the vulnerability of the country to a sudden credit rationing by foreign lenders. Note that over 7 years prior to the crisis, the sustainability of Indonesia's balance of payments was highly dependent on the willingness of foreign lenders to roll over short-term debts and on continuing large portfolio capital inflows. This was probably a safe assumption in that period, because there were no external or internal shocks to shake the confidence of foreign creditors. However, it also meant that a liquidity crisis could have erupted at any time.

It is striking that the liquidity ratio of Indonesia and Korea in 1996 was very close to that of Latin America (average of Argentina, Brazil, Chile, and Mexico) in 1981. Moreover, as seen in Figure 9.5, Indonesia, Korea, and Latin America exhibited persistent increases in the ratio several years prior to the

crises. On the other hand, the Philippines was able to reduce the ratio to a lower level. The ratio for Thailand and Malaysia was almost stable through time. Surprisingly, Malaysia should not have had a 'liquidity problem' as its ratio was less than one, and yet the country was swept into the crisis. This suggests that the crises were more than just a liquidity crisis. As Athukorala (2000) and Soros (1998) maintain the main problem with Malaysia was the weak banking sector. Indeed, the Asian crisis first erupted after the crash of several quasi-bank finance houses in Thailand. As will be argued in section 9.6, a weak banking sector made it difficult to deter currency attacks and prevent a reversal of capital inflows.

**Figure 9.5.** *The ratio of liquid foreign liabilities to foreign exchange reserves (%)*



Sources: World Debt Tables and International Financial Statistics

Nevertheless, a liquidity problem seems to have been an important factor in aggravating currency attacks in Indonesia and Korea.<sup>7</sup> This was particularly true in explaining the extent of exchange rate depreciation experienced by

<sup>7</sup> Calvo and Goldstein (1996) showed that a similar liquidity problem made Mexico more vulnerable than its neighbours to currency attacks in 1994.

Indonesia in the later stage. Note that Indonesia was the worst case in terms of currency depreciation. On the other hand, although showing the worst liquidity mismatch, Korea avoided a much larger depreciation because foreign debts were restructured and rescheduled much earlier than Indonesia.

In the model, the effects of liquidity mismatch are channelled through expected depreciation. A higher mismatch will induce a larger excess demand for foreign exchange when capital inflows slacken, therefore inducing a larger expected depreciation. In effect, this will induce a further reduction in capital inflows, as the credit worthiness of domestic firms is downgraded and portfolio investments in domestic shares become less attractive for foreign investors.

### **9.3.3. Currency mismatch**

Another important factor that can aggravate attacks on the currency is the need for domestic corporations to meet their unhedged foreign liabilities. This refers to the currency mismatch problem. This occurs if most revenue is denominated in domestic currencies whilst liabilities must be paid in foreign currency. Goldstein (1998), amongst others, suggests that currency mismatch on the part of corporations was one of the main problems in Indonesia.

There are two possible effects of currency mismatch. First, if lenders expect a currency crisis to occur, credit rationing is likely to be imposed on firms with currency mismatch. This sudden rationing can make the expectation self-fulfilling, as debtors rush into the foreign exchange market. Second, once the crisis occurs, it become very difficult to recover, because currency depreciation makes it harder to meet the liabilities (Mishkin 1996).

Due to difficulties in obtaining official data, the debt structure of 164 corporations listed on the Jakarta Stock Exchange is used as a sample. By June 1997, the total foreign debt of these corporations accounted for \$ 20.4 billion, or about one third of the Indonesia's private foreign debt. Their financial reports contain detailed information regarding size, creditors, denomination, type, interest rates and maturity of the debts. They also report hedge transactions, and other foreign exchange commitments.

**Table 9.2. Foreign debts and hedge (June 1997)**

Sector	Foreign Debts (% of total assets)	Hedged Debts (% of foreign debts)
Domestic oriented	56.0	5.3
Import Competing	10.7	6.6
Export Oriented	32.7	0.2
NBFI	14.0	47.0

*Source:* calculated from raw data obtained from Jakarta Stock Exchange

Table 9.2 presents the proportion of hedged foreign debts of 164 (non bank) companies listed on the Jakarta Stock Exchange. The companies are grouped into four categories, domestic market oriented, import competing, export oriented, and non-bank financial institutions. Non-bank financial institutions include insurance, factoring, leasing, portfolio managers, and venture capital. Domestic market oriented companies consist of companies producing non-tradable goods and services. These include real estate and properties, retail (super market) and restaurant chains, inland transport industry (taxies and toll roads), and hotels. The rest of the companies are classified into import competing and export oriented industries by using Pit's (1981) formulae.<sup>8</sup>

The above table shows that domestic-market oriented firms were the most vulnerable to an exchange rate depreciation. They had the highest level of foreign debt, with most revenue denominated in domestic currency. Moreover, the proportion of hedged debts is only 5.28%. These companies are likely to be affected by exchange rate depreciation from two fronts. Because assets and revenue are denominated in domestic currency, debt principal and interest payments will increase. In addition, revenues are likely to fall as a result of the contractionary impact of depreciation on aggregate expenditure. For these reasons, there are strong grounds to suggest that panic buying of foreign exchange most likely occurred amongst these firms.

<sup>8</sup> The formulae says that if the index is less than zero, the sector is classified as an export oriented industry; greater than zero but less than 0.8 is import competing industry otherwise; and greater than 0.8 is non-competing (domestic oriented) industry. The index is formulated as follows:  $t = (\text{imports} - \text{exports}) / (\text{production} + \text{imports} - \text{exports})$ .

Export oriented firms have the second largest proportion of foreign debts and the smallest share of hedged debts. However, since most revenue is denominated in foreign currency, the increase in the domestic value of foreign debt can be offset by the increase in revenue. This is called a natural hedge.

Non-bank financial institutions (NBFIs) seem to have been more prudent. Foreign borrowing was moderate and the share of hedged debts the largest. Most of the hedges come from currency swap transactions, which are common practice amongst financial institutions.

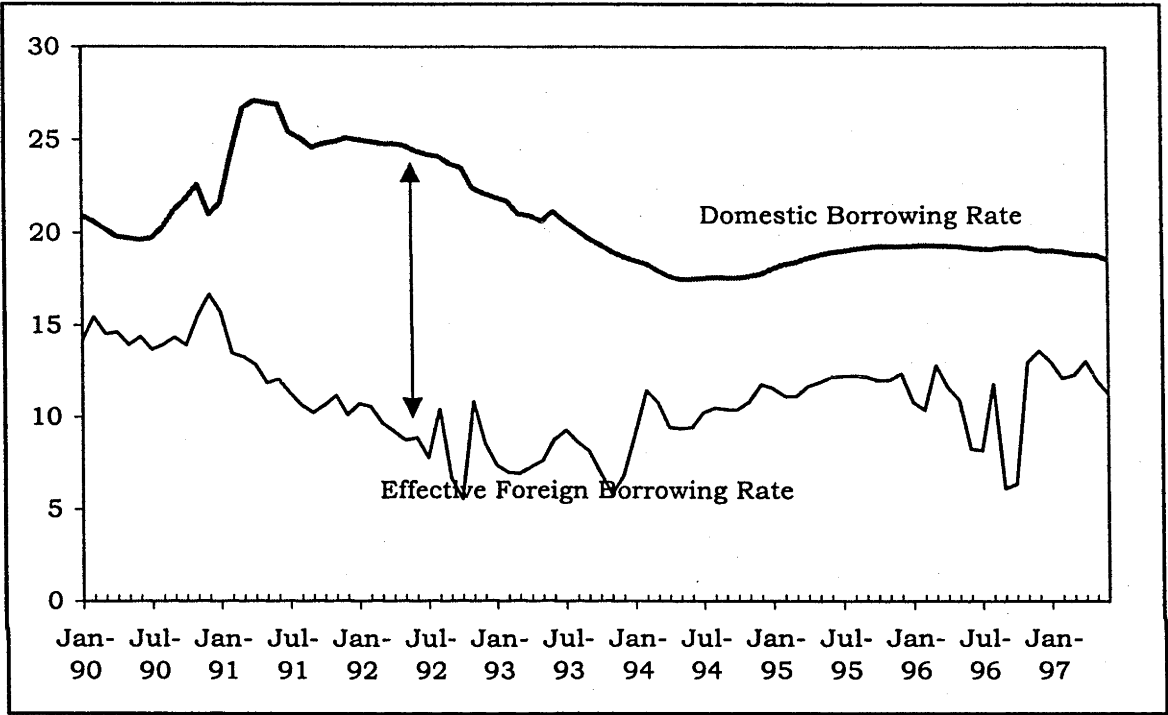
Import competing industry had the smallest foreign debt. This is somewhat surprising, but may be explained by low credit worthiness of firms operating in the industry. Such an industry was probably not as lucrative as the property sector. Therefore, foreign creditors limited the loans only for imports of intermediate and capital goods. Note that, based on inspection of their financial statements, foreign debt was mainly for trade financing.

The fact that domestic market oriented firms are amongst the most leveraged by foreign creditors raises an interesting question. For export oriented industries, it can be regarded as prudent if most debt is denominated in foreign currency, as they are covered by a 'natural' hedge. However, for domestic market oriented firms, currency mismatches can be a big problem. There are three possible explanations for a high level of foreign debts owed by these companies. First, they are operating in the most lucrative activities, i.e. high returns and quick yields such as the property sector. Second, the stability of the exchange rate over a long period made foreign borrowing appear as safe as domestic borrowing. Third, the high interest rate differential made foreign borrowing appear to be cheaper.

Figure 9.6 depicts the effective interest rate margin between domestic and foreign borrowing. For domestic borrowing, the rate for working capital loans is used. For foreign borrowing rate, we select Singapore's inter-bank rate for US dollars with a 3 month maturity plus 2.74 per cent premium. Note that based on the data from the Jakarta Stock Exchange, the interest rates charged

are tied to the Singapore rates plus 2.74 per cent premium.<sup>9</sup> We also adjust the Singapore rate to allow for the ex post depreciation of the Rupiah against the US dollar for each period.<sup>10</sup> In effect, this measures the rupiah equivalent of interest payment on the loans denominated in US dollars.

**Figure 9.6.** *Effective Interest Rate Spread Between Domestic and Offshore Borrowing, 1990-1997*



Source: CEIC data base, Hong Kong

As seen in Figure 9.6, there was a wide margin between the domestic interest rate and effective foreign interest rate, making foreign borrowing more attractive. The average margin was about 9.8 per cent, with a standard deviation of about 3.7 per cent. The high margin indicated that offshore loans were cheaper, while the low standard deviation meant that hedging was unattractive. In other words, there were incentives to borrow offshore, and

<sup>9</sup> The 2.74 per cent premium was the simple average premium. The premium charged actually varies from 2 to 5 per cent, depending who is borrowing from whom.

<sup>10</sup> This depreciation figure is calculated from quarterly exchange rate data for each period.

disincentives to hedge. This might partly explain why borrowing was largely unhedged.

In summary, in the lead-up to the crisis there were mounting liquidity and currency mismatches, making the economy vulnerable to a speculative attack. Moreover, they may also be detrimental at the onset of the crisis, in that the excess demand for foreign exchange is more likely to be produced by larger mismatches. In the following section, a measure of the excess demand will be introduced.

## **9.4. Foreign exchange market pressure**

### **9.4.1. Market Pressure Index**

The crisis began with a severe attack on the currency, soon after the Thai baht collapsed in July 1997. The fierce attacks that continued to occur in the following months were the biggest challenge for the authorities in maintaining a stable monetary stance.

In order to measure the intensity of currency attacks, the well known 'market pressure index' (MPI), proposed by Girton and Roper (1977), will be used.<sup>11</sup> The idea is that excess demand for foreign exchange may be accommodated through three different channels: depreciation, a fall in foreign exchange reserves, and an increase in the domestic interest rate. Following the attacks, the currency may be allowed to depreciate or devalue. Alternatively, the excess demand may be met by running down foreign exchange reserves or staved off by increasing the domestic interest rate. Therefore, there are three important variables for measuring the severity of exchange market pressure: the changes in exchange rates, foreign exchange reserves, and domestic interest rates relative to international interest rates.

The MPI is defined as:

$$(9.1) \quad MPI_t = \beta_1 \Delta e_t + \beta_2 \Delta R_t + \beta_3 \Delta(i_t - i_t^*)$$

where:  $\Delta e_t$  = percentage change in the nominal exchange rate,

$\Delta R_t$  = percentage change in foreign exchange reserves,<sup>12</sup>

$\Delta(i_t - i_t^*)$  = percentage change in the interest rate differential, and

$\beta_i$  is the weight for each variable.

Note that it is crucial to determine the appropriate weights, as the volatility of one variable may dominate the fluctuation in the index. To avoid this problem, standard deviations are used as the weights. The index is constructed for the period covering January 1992 to December 1998. However, the standard deviations are estimated for the period up to June 1997. In so doing, the fluctuations in the index during the crisis are measured relative to pre-crisis fluctuations. The estimated index is presented in Figure 9.7.

As seen in Figure 9.7, the pre-crisis period was characterised by a relatively tranquil situation. The relatively stable index indicates that there was no significant market pressure, either indicating excess demand for, or, excess supply of, foreign exchange. As has been mentioned, the authorities had successfully maintained the exchange rate within the intervention band. Moreover, the monetary management had seemed not too distressful, since the 1990s were characterised by ample capital inflows. Though the exchange rate tended to hit the lower bands – indicating pressure for appreciation – the index showed that the pressure was relatively small.<sup>13</sup>

The market pressure became unusually high between July and September 1997. A spike in the index occurred in August 1997, which coincided with the adoption of the floating exchange rate regime. After it was floated, the movement of the exchange rate was barely predictable. Aside from several weaknesses suffered by the banking sector, the severity of the attack might be partly responsible for the difficulties faced by the authorities in defending the currency in August 1997. Note that the index showed that

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<sup>11</sup> This index has been used widely, because of its simplicity. See, for example, Eichengreen, Rose, and Wyplosz (1996) for its application to currency crises.

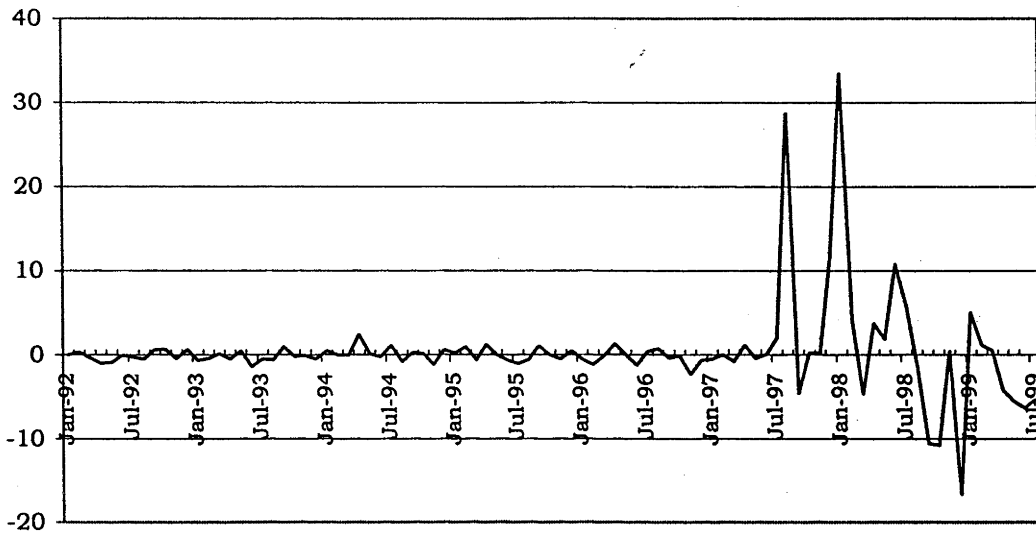
<sup>12</sup> As in Girton and Roper, the reserves are measured relative to narrow money (M1).

<sup>13</sup> This was probably the result of active sterilisations.



market pressure in that month was about 27 times higher than the average pressure during the pre-crisis period.

**Figure 9.7.** *Market Pressure Index, January 1992-December 1998*



Market pressure intensified again, between December 1997 and February 1998, and between April and July 1998. The former coincided with panic runs on several private banks after the liquidation of 16 banks. The later pressures reflected the political turmoil and social unrest during that period. This will be discussed in Chapter 10, where the propagation of the crisis is analysed.

#### **9.4.2. Trigger and regional contagion**

The years leading up to the crisis may be viewed as an 'incubation period' of balance of payments vulnerability, in that the crisis could have occurred any time. As suggested by the MPI, the crisis did not occur earlier possibly, because of the absence of a severe attack. Because of that, the issue of contagion becomes relevant.

Masson (1998) defines contagion rather strictly, that is a crisis in one country can lead to a similar crisis in another country, which does not have any

direct economic linkages or share similar economic fundamentals. However, in this study, contagion is defined rather loosely to include pure contagion, spill over, wake-up call and capital market interdependency.<sup>14</sup> Regardless of which definition of contagion is a more meaningful explanation, our model treats the effects of contagion through three channels, namely regional capital flows, risk premium, and expected depreciation.

Aside from country specific factors, an excess supply of capital in developed and newly industrialised countries may also have been driving the capital inflows to the region. In other words, the inflows may be driven by the need to dampen excess supply by employing lucrative opportunities in the emerging markets. On the demand side, there may be different factors driving developing countries to borrow. For instance, in the late 1970s the need to recycle the proceeds from the oil boom led to a lending boom to Latin American countries. Yet, each country in the region seemed to have a different reason to borrow overseas. In Brazil and Argentina the borrowing was largely driven by the need to finance budget deficits, while in Chile it was the conglomerates that borrowed (Edwards 1995). For the Asian case in the 1990s, most of the foreign loans were granted to domestic banks in South Korea and Thailand. In Indonesia, it was the non-bank corporations that borrowed, and this may have been due to the restrictions on bank borrowing. In other words, the excess supply in capital will always find its way to developing countries, as long as they can offer attractive returns.<sup>15</sup>

This has important implications for the case of capital inflow reversal. First, any factor affecting capital inflows, to the region in particular, and to emerging markets in general, would have affected the size of capital inflows to Indonesia as well. For instance, Eichengreen (1999) emphasises an anticipated rise in Japanese short term interest rate in the northern spring of 1997 as being the trigger to the fall in capital inflows to the region; while McKibbin

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<sup>14</sup> For the different definition of contagion, please refer to Chapter 2, section 2.5.

<sup>15</sup> As discussed in section 8.4, there is a strong statistical evidence suggesting that capital flows to Indonesia are strongly correlated with the flows to the region. If this is true, then the reversal of capital inflows will also be affected by the events in the region.

(1998) stresses the role of the US interest rate hike in late March 1997, and the subsequent drop in the US stock market. As a result, the collapse of the Thai baht was only the first in a series of foreign exchange collapses in the region. In other words, an interest rate hike in the developed countries was a common trigger of the balance of payments crisis in the region.<sup>16</sup>

Second, the same episode of capital inflows might have been translated into a similar pattern of booms in investment and consumption across the region. Then, when the bust occurred in Thailand, foreigners would have cast doubt on the sustainability of the boom in the other countries of the region. In other words, the perceived risk attached to Indonesia would increase. Consequently, rather than waiting for a similar bust, they might have opted for an early exit which then triggered a run on foreign exchange reserves. Note that our theoretical model suggests an increase in risk premium will provoke a fall in capital inflows (see section 9.5. for empirical applications).

Third, after the collapse of the Thai baht, other currencies may have been tested, and this could have precipitated excess demand for foreign exchange reserves. In this case, the attacks may have been purely idiosyncratic in that they were independent of the countries' fundamentals.<sup>17</sup> The attacks may also represent herding and Diamond-Dybvig attacks, in that, because other investors are expected to opt for an early exit, every investor jumps into the queue as early as possible, with an expectation that the currency will need to depreciate if foreign exchange reserves are not sufficient to meet the excess demand for foreign exchange.<sup>18</sup> The problem is that money managers do not have a coordinating device that can produce collective attacks. Therefore, they need some kind of signal that can affect their perception regarding the probability of an exchange rate collapse. A crisis in another country may act as a coordinating device for money managers to attack other currencies, in that it

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Indeed the model suggests that the fall in capital inflows to the region will cause a fall in capital inflows to Indonesia as well (see section 9.5).

<sup>16</sup> Calvo et al. (1994 and 1996) have emphasized similar view for the cause of capital inflows reversal characterising the 'tequila effects'.

<sup>17</sup> This was shown by the fact that countries with 'strong' fundamentals such as Singapore were also attacked.

<sup>18</sup> McLeod (1997) and Radelet and Sachs (1997) asserted this 'panic run' hypothesis.

can cast doubt over the reliability of monetary stances in these countries (Tornell 1999). If the fundamentals of the other countries are not so strong, they may also be swept into a balance of payments crisis. Indeed, our model suggests that an increase in expected depreciation can lead to a reversal in capital inflows (see section 9.5 for empirical application).

## 9.5. Capital Inflow Reversal

The exceptional spike of the MPI at the onset of the crisis reflects the excess demand for foreign exchange stemming from the need to shift funds out of the country. A negative swing in capital inflows will be translated into a fall in foreign reserves and exchange rate depreciation, if the interest rate hike cannot prevent it. Indeed, such a swing is a common phenomenon of both the Asian and Latin American crises (see Figure 9.8). It is interesting to note that the largest swing occurred in Thailand and Indonesia, the two worst affected countries.

The purpose of this section is to trace the possible causes of such a swing by employing the so-called impulse response function. The idea is that the responsiveness of capital flows to different shocks may reveal some differences. The model introduces four shocks which may affect capital inflows to Indonesia, namely shocks on regional capital flows, expected depreciation, risk premium, and the domestic and international interest rate.<sup>19</sup> The following discussion will simulate the effects of these four shocks.

The model specifies the VEC characterising Indonesia's capital flows as follows:

$$(9.2) \quad \Delta z_t = a_0 - \Pi z_{t-1}^- + \sum_{i=1}^{p-1} \Delta z_{t-i} + \varepsilon_t$$

where:  $\Delta z = (\Delta K_I^*, \Delta K_R^*, \tilde{e}, \Delta r, \Delta r^*)$  and  $z^- = (K_I^*, K_R^*, r - r^*)$ ,

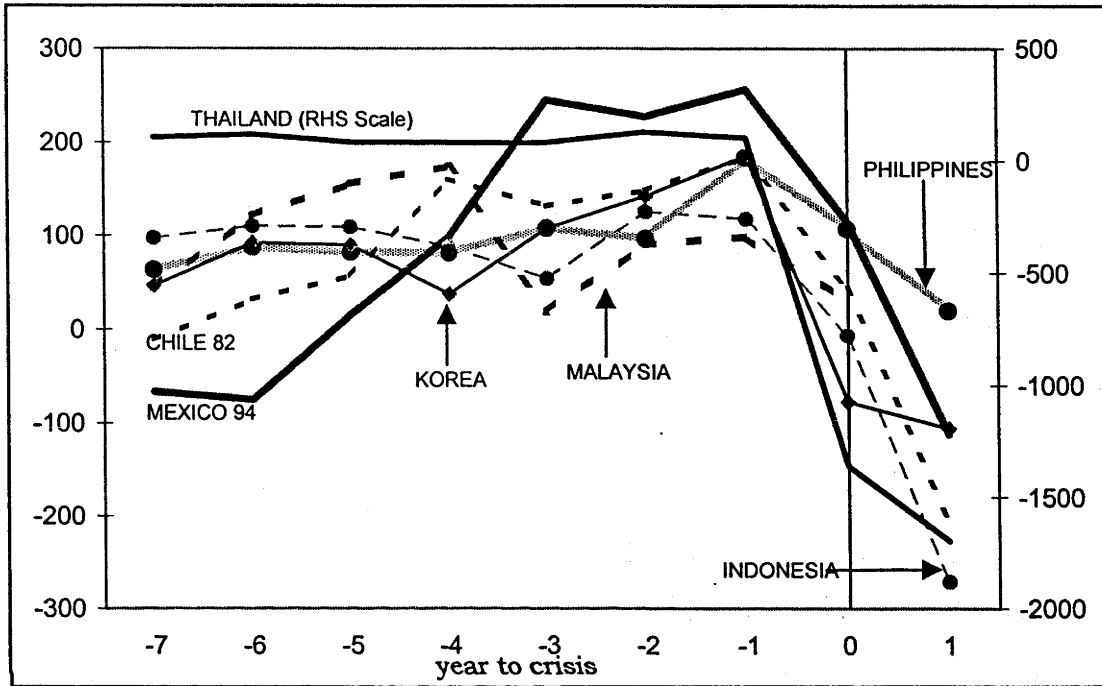
$K_I^*$  is capital inflows to Indonesia,

$K_R^*$  is capital inflows to the region

$r$  and  $r^*$  are domestic and international interest rates, and

$\tilde{e}$  is expected depreciation.

**Figure 9.8.** *Index of private capital flows per GDP*  
(pre-crisis period average=100)



Note: Right hand scale is for Thailand, while the left hand scale is for the other countries.

Source: IMF, International Financial Statistics

Because expected depreciation is an  $I(0)$  process, it does not enter the long-run cointegrating vector.<sup>20</sup> Moreover, the risk premium is not included because it is assumed to be constant during the pre-crisis period.<sup>21</sup> However, it will be clear later that the shock (increase) in the risk premium can be imposed directly in the simulation.

<sup>19</sup> See Chapter 7 for variable definition.

<sup>20</sup> In our model, the expected depreciation is estimated as the actual three-month ahead depreciation, implying a perfect foresight.

<sup>21</sup> It is assumed constant, because it is difficult to measure the premium.

Based on the above specification, simulations are done to obtain impulse response functions. Note that the simulation procedures applied here are different from the procedure applied to the full model simulation outlined in section 7.5. The idea is that the effects of a shock have to be accommodated through the change in capital account balances or the level of foreign exchange reserves level while maintaining other domestic equilibrium conditions unchanged. In other words, the vulnerability of capital account balances and foreign exchange reserves to a certain shock is going to be assessed. Thus, the simulations are not intended to replicate the actual capital inflows reversal.

In order to do this, the VEC specified in equation (9.2) is estimated. In each simulation several strict assumptions are imposed so that the equilibrium in the domestic economy remains unchanged. The first simulation outlined below involves a negative shock in regional capital flows, and the simulation is intended to measure the effect of slackening global capital flows to the region.

There are three strict assumptions imposed in the simulation for obtaining impulse response functions to the shock on regional capital flows. First, the foreign interest rate is assumed to be constant, in the sense that it is not affected by the shock. Second, the domestic interest rate is assumed to be constant, which means that domestic financial markets are unaffected by the shock.<sup>22</sup> This assumption is needed to see the effect of regional contagion purely translated to the change in capital flows. In other words, the change in capital flows will be fully accommodated by the change in foreign exchange reserves. The first and second assumptions imply that the interest rate differential now consists only of expected depreciation. Third, the equilibrium in the rest of the economy is unaffected by the change in the reserves. This is needed to contain the effect of the decline of reserves in public confidence that

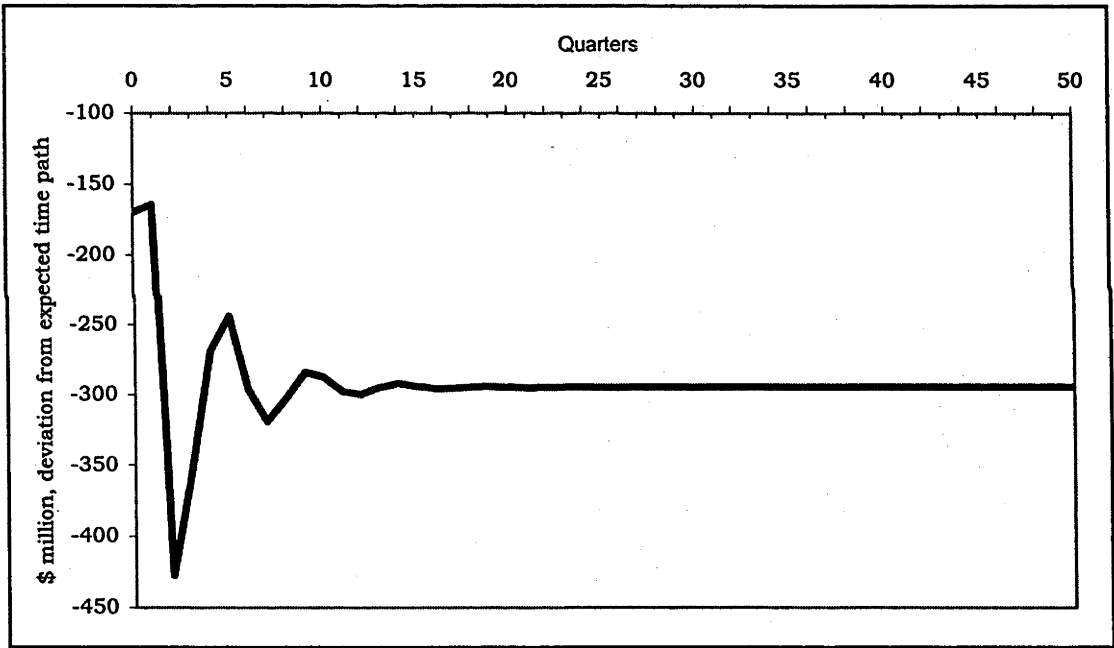
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<sup>22</sup> If the domestic interest rate were to be affected by the shock, a simulation on the full model is required. However, it has not been specified as yet how the authorities and domestic agents would respond to the shock.

may otherwise result in a run on the reserves, in the sense of Krugman (1979).<sup>23</sup>

In effect, by imposing these three assumptions, it is only necessary to consider three variables in the simulation namely: capital flows to the region and Indonesia, and expected depreciation of the rupiah. Because very restrictive assumptions are imposed, the results should be interpreted with great caution. It should be stressed from the outset that these assumptions may result in the effects are being under estimated. Nevertheless, the purpose is to assess the potential effects, and the actual ones

**Figure 9.9.** *Generalised impulse response functions to a negative (one standard deviation) shock in regional capital inflows.*



<sup>23</sup> A panic run on foreign exchange reserves is generally a non-linear process, which is conditional on the probability of an exchange rate collapse. In order to incorporate this in the model it is necessary to employ a rational expectation model which involves a tedious mathematical and statistical manipulation, even in a very simple monetary model. This is avoided by imposing the third assumption.

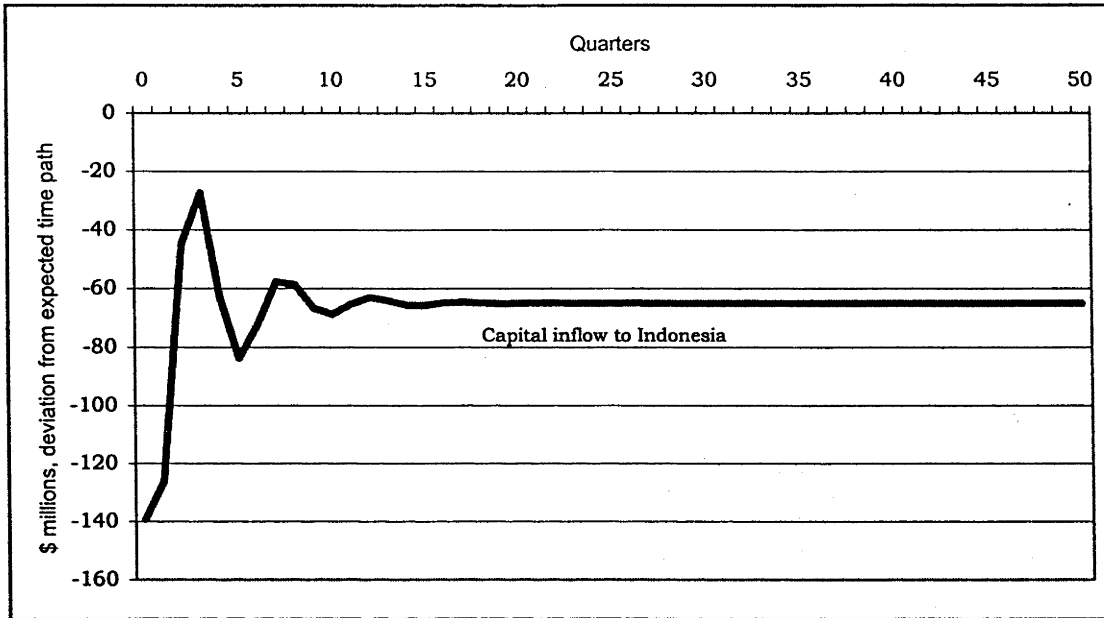
As seen in Figure 9.9, a negative one standard deviation shock in regional capital inflows will cause a decline in capital inflows to Indonesia. Note that one standard deviation in the regional capital inflow is equal to \$ 684 million. The biggest effects are predicted to occur in the third quarter, where capital inflows to Indonesia dive to minus \$ 427 million. The impact will stabilise after 16 quarters at around minus \$ 295 million. Therefore, in the long run, and holding every thing else constant, the shock will have a permanent effect on Indonesia's capital flows. This finding suggests that there are empirical grounds for supporting the view that the swing in capital inflows to Indonesia that occurred during the crisis might have been the effect of regional contagion.

The second simulation shows the effects of an increase in expected depreciation on capital flows. The collapse of the Thai baht might have also directly affected the credibility of Indonesia's crawling peg, in that it induced speculative attacks on Indonesia's currency. Moreover, currency mismatch and high level liquid foreign liabilities might breed some sort of balance of payments vulnerability, in that the change in expectations regarding the value of the exchange rate could have generated excess demand for foreign exchange. Figure 9.10 depicts the impulse response function of capital inflows to the shock (increase) in expected depreciation.

The figure suggests that a one standard deviation increase in expected depreciation can lead to an instantaneous decrease in capital inflows of around \$ 140 million. For the subsequent 18 quarters, the function shows some volatility. Nevertheless, it is always negative. After that, it stabilises at around minus \$ 65 million. This finding suggests that a change in expected depreciation that may be provoked by a crisis elsewhere can induce a fall in capital inflows.



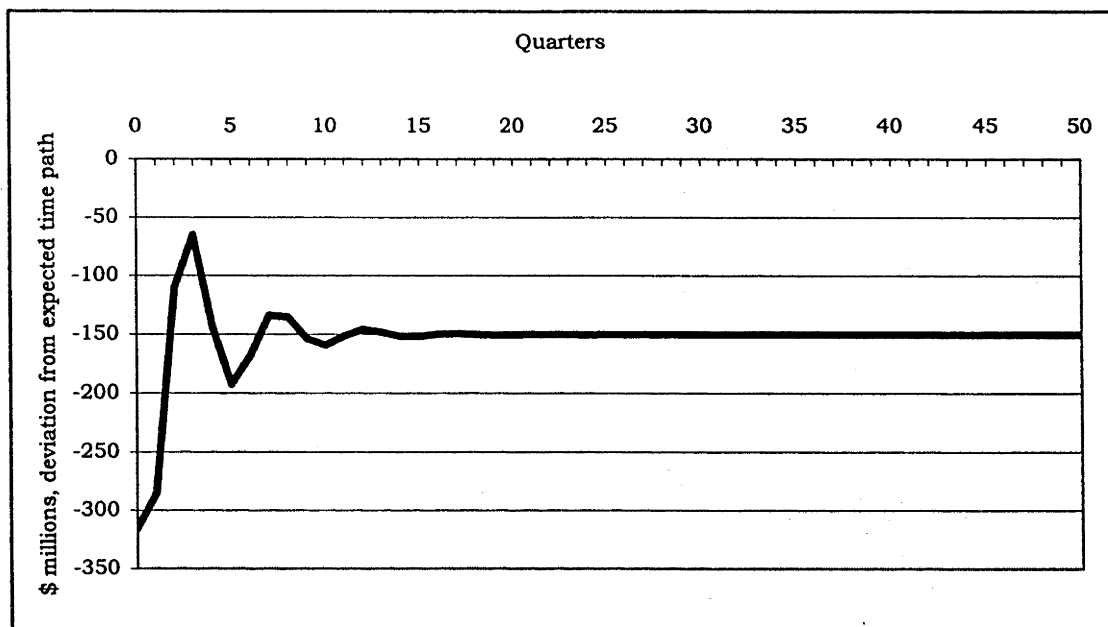
**Figure 9.10.** *Impulse response function of capital inflows to one standard deviation shock on expected depreciation*



In the third simulation, the effects of an increase in the foreign interest rate on capital flows will be assessed. McKibbin (1998) and Eichengreen (1999) emphasize the role of the increase in the interest rate in developed countries as the trigger for the Asian crisis. In this model, the international interest rate is treated as an exogenous variable in that, although the shock in that variable affects the other variables, there is no feed back effect from the other variables. After the shock, the international interest rate evolves based on its historical value.

Figure 9.11 demonstrates the effect of a one standard deviation increase in the international interest rate on capital inflows. It suggests that the largest swing will occur in quarter 0 (instantaneous effect) and quarter 1. After that, capital inflows show some volatility, but the effect is still negative. The instantaneous effect is a decline in capital inflow of about \$ 315 million. The effect stabilises at around minus \$ 150 million, after 18 quarters.

**Figure 9.11.** *Impulse response function of capital inflows to one standard deviation shock in the foreign interest rate*



It can be concluded that an increase in the international interest rate tends to reduce capital inflows. Therefore, there are empirical grounds to believe that an increase in the international interest rate was one of the possible triggers for the crisis.

In the fourth simulation, the effects of the increase in perceived risk will be analysed. McKibbin and Martin (1998) maintained that this factor is the key to understanding the reversal of capital inflows to the region. However, there are two technical difficulties in doing the simulation.

First, due to measurement difficulties the risk premium is not included in the empirical estimation. However, the theoretical model suggests that the effect of the change in the risk premium would be similar to that of the change in the foreign interest rate. Therefore, in the following simulation it will be assumed that the instantaneous effect of the shock in the risk premium is the same as that of the shock in the foreign interest rate. After the shock, the

premium is assumed to be constant or permanent. In addition, the shock is assumed not to affect the foreign interest rate.

The second difficulty is in measuring the change in the risk premium. McKibbin and Martin (1998) use the change in the ex-post nominal interest rate differential. However, this approach tends to underestimate the premium, since the increase in the domestic interest rate did not effectively prevent capital outflows. Theoretically, the increase in risk premium will be fully offset by the increase in the domestic interest rate if, and only if, capital inflows stay at the initial equilibrium. Because the change in risk premium is unknown, an arbitrary value of 5 per cent is taken.

Figure 9.12 reports the impulse response function of capital inflows to the 5 per cent increase in risk premium. The impulse response function may be interpreted as follows. A 5 per cent increase in perceived country risk will cause a \$ 574 million contemporaneous decline in capital inflows. Over the long-run, the decline will stabilise at around \$ 229 million. This suggests that the capital inflow is indeed responsive to such a shock.

However, this result should be interpreted very cautiously, since the effects of the change in perceived risk is naturally non-linear. Meanwhile, the model is linear and will therefore tend to understate the effects. For instance, a 15 per cent increase in the perceived risk should totally wipe out the comparative advantage of investing in domestic bonds and therefore induce massive capital outflows.<sup>24</sup> The model will in fact only predict an instantaneous fall in capital inflows of \$ 1.72 billion.

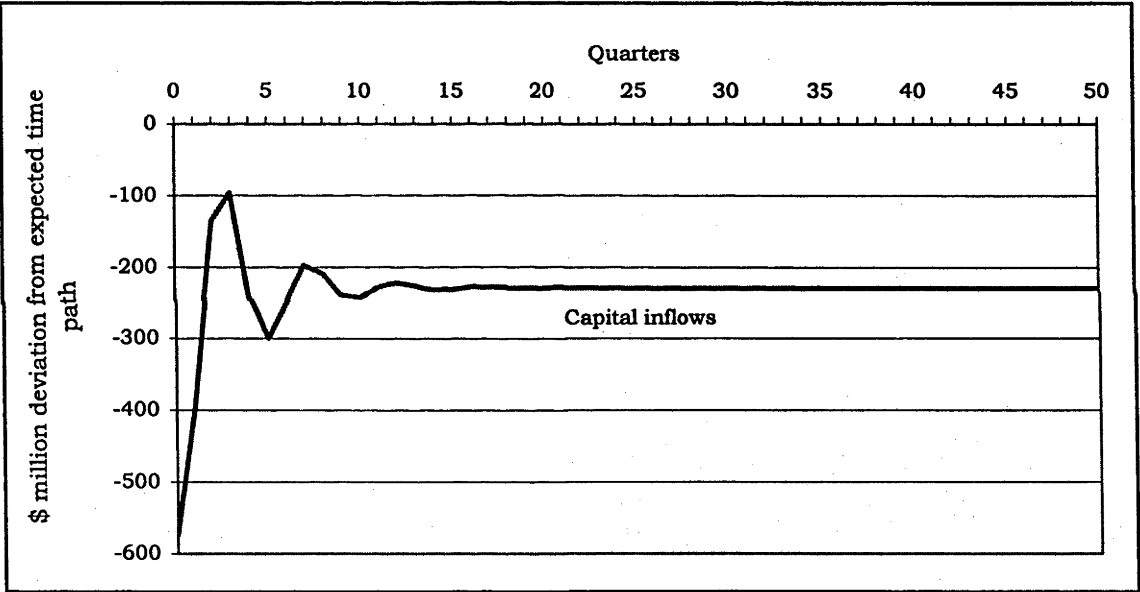
Although the model is not able to capture the non-linear effects, there is another way to interpret the results. The market pressure index suggests that the pressure at the onset of the crisis was about 27 times higher than that before the crisis. If it is assumed that the pressure was solely due to the increase in risk perception, the MPI suggests a striking jump in perceptions. Note that based on the financial statements of firms listed on the Jakarta Stock

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<sup>24</sup> Note that the nominal interest differential before the crisis was only 9.45 per cent, on average.

Exchange the risk premium was at least 2 per cent. Multiplying this number by 27 would suggest that the perceived risk jumps from at least 2 per cent to 54 per cent. If this is correct, a 50 per cent increase in the risk would be translated (linearly) as a \$ 5.7 billion instantaneous decline, and \$ 2.3 billion permanent decline in capital inflows. This is a relatively large swing in capital inflows. This leads to the belief that the risk premium story is a good candidate for explaining the surge in capital outflows. There are some factors that may further provoke the risk, such as a weak banking sector, and political uncertainty. The role of a weak banking sector will be discussed shortly in the next section.

**Figure 9.12.** *Impulse response function of capital inflows to a five per cent increase in risk premium*



The simulation has so far provided consistent predictions regarding the responsiveness of capital inflows to the changes in perceived risk, expected depreciation, the international interest rate and regional capital inflows. However, since the model cannot decompose the contribution of each of these factors to the reversal of capital inflows, it is difficult to undertake a counterfactual simulation.

## **9.6. Ineffectiveness of an interest rate hike**

In this section, the (in)effectiveness of a rise in interest rate in defending the crawling peg and for preventing capital outflows will be assessed. This will rely on the impulse response analysis. The impacts of an interest rate hike and an exchange rate depreciation on the banking sector will be assessed for a comparison.

As suggested by Tornell (1999), the authorities can choose three policy options in responding to exchange rate attacks and in meeting the excess demand for foreign exchange, namely: (1) running down foreign exchange reserves, (2) increasing interest rates, and (3) devaluing the currency. In the previous section, it was shown that, in the run up to the crisis, liquid foreign liabilities were already much higher than foreign exchange reserves, which suggests that reserves were inadequate. Moreover, as discussed in section 9.2, the authorities had already poured about \$ 1 billion to intervene in the market without any success. Thus, there were technically only two options available to the authorities.

For the second option, the idea is that an increase in expected depreciation and perceived country risk can be offset by an increase in the domestic interest rate in order to maintain the existing capital account equilibrium. However, Obstfeld and Rogoff (1995), amongst others, maintain that this strategy can only work effectively if the banking sector can resist the adverse impacts of an increase in the interest rate. Indeed, the model suggests that, in the case of a weak banking sector, an interest rate hike will be ineffective as it can further complicate the banking problems. Non-performing loans may increase and the interest margin decreases, which may lead to an interruption in the banks' cash flow. Because the central bank functions as a lender of the last resort, it may have to extend liquidity assistance to assist the commercial banks. It may be difficult for the authorities to manage the money supply if the banking problems are already complicated.

If the third option is chosen, the adjustment process is channelled through the current account balance. In other words, a reversal of capital inflows is financed by inverting the current account balance from negative to positive. This can be done through a real devaluation, by which imports can be reduced and exports improved.

The analysis applied here will be based on the simulation on the full model solution as described in section 7.5. Though it is possible to discuss the economy wide effects, these will be reserved for Chapter 10 (propagation of the crisis). For the purpose of this chapter, it is sufficient to discuss the effects on the banking sector.

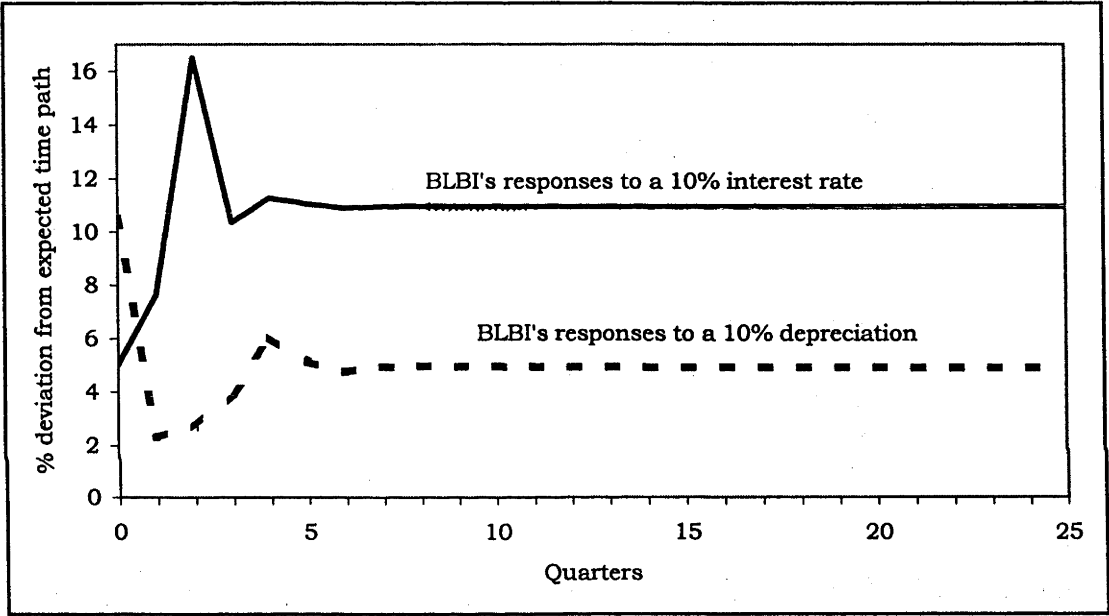
Two shocks will be given to the system. First, a ten per cent nominal exchange rate depreciation is imposed in order to analyse the impacts on the banking sector if the authorities opt to offset a deterioration in the capital account balance by improving the current account balance. Second, as an alternative, the interest rate may be raised to offset the increase in expected depreciation and country risks. In order to make it comparable, the interest rate shock is also ten per cent. The idea is that, if expected depreciation, or the risk, increases by ten per cent, then a ten per cent increase in the interest rate should be sufficient to offset it, given that an increase in that interest rate does not provoke a further increase in expected depreciation or risks. However, as will be shown later, an interest rate increase cannot fully offset the expected depreciation.

The final results of the simulation are depicted in Figure 9.13. The effects of the shock are measured in terms of liquidity assistance extended by the central bank to the domestic commercial banks (BLBI). As discussed in section 8.5, BLBI is an aggregate proxy for measuring banking fragility.

The contemporaneous effect of a ten per cent exchange rate depreciation is a 10.5 per cent increase in the BLBI. The demand for BLBI then shows a fluctuation up to the ninth quarter, and stabilises at around 4.9 per cent thereafter. This suggests that exchange rate depreciation does impose a cost on the banking sector. Even without the aggregate balance sheets data of

domestic corporations, it is worth linking this finding with the currency mismatch problems discussed in section 9.3. Some firms operating in the non tradable sector and possessing currency mismatch may get caught by the depreciation and find it difficult to service debts. Consequently, these firms are likely to generate non-performing loans. Note that banks do not possess currency mismatch, and therefore the effect of depreciation is indirectly channelled through firms' balance sheets.<sup>25</sup>

**Figure 9.13.** *Impulse response function of bank bail out to a 10 per cent increase in the interest rate and exchange rate.*



The impact of a ten per cent interest rate increase will be a 4.5 per cent instantaneous increase in BLBI. After that, BLBI increases sharply to 16.5 per cent and stabilises at around 10.9 per cent. This means that the costs of the interest rate hike imposed on the banking sector are smaller in the shorter term, but higher in the longer term. This finding is in contrast to the hypothesis asserted by Fischer (1997), that for most developing countries devaluation is more costly than an interest rate hike.

<sup>25</sup> See empirical results in Chapter 5

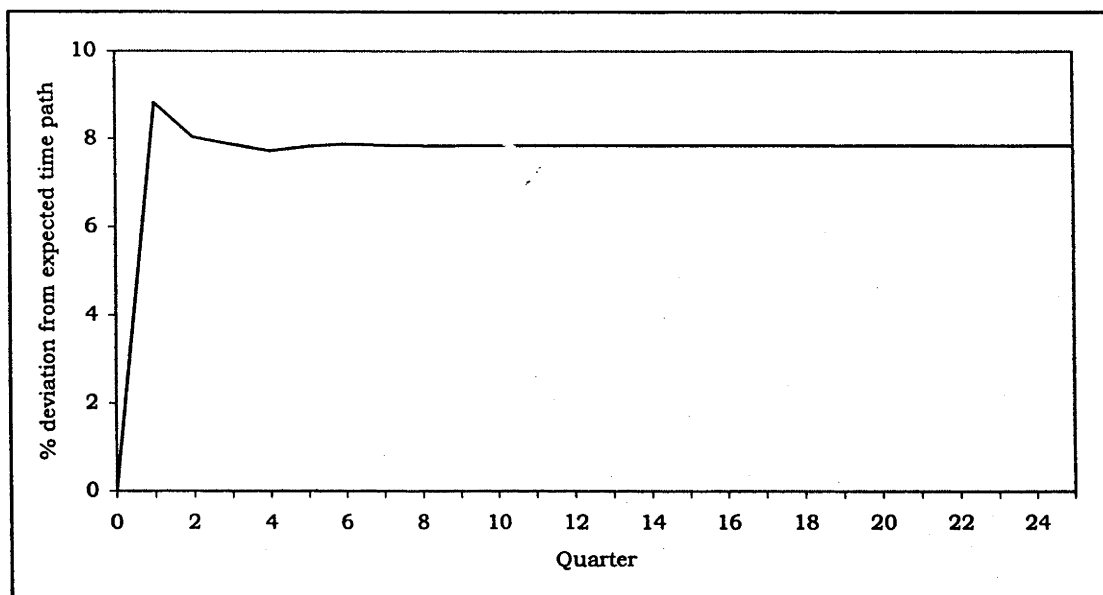
The fact that an interest rate hike is more costly can perhaps be explained by its effects on firms' and banks' balance sheets. Note that devaluation only hurts firms with currency mismatch and, at the same time, induces an expansionary impact on export-oriented sectors. On the other hand, an interest rate hike will hurt all firms and banks. If the lending rate is fully adjusted, default risks and moral hazard problems may increase. To reduce these problems, banks may not fully adjust the lending rates in the same proportion as deposit rates. However, this will reduce the interest rate margin. Either way, banks will be the ultimate victims.

This finding has an important policy implication. An interest rate hike does weaken the banking sector more than an exchange rate depreciation. If this is anticipated by agents, they may persist with attacking the currency, because the probability of a successful attack becomes higher in the weaker banking environment. In effect, the hike may not be credible, in that depreciation cannot be prevented. In order to assess this possibility, we provide an impulse response function of the nominal depreciation to the shock in expected depreciation and increase in the interest rate. The result is depicted in Figure 9.14.

The idea of the simulation is that the authorities will react by increasing the nominal interest rate by 10 per cent to counter the increase in expected depreciation of the same percentage points. If the interest rate hike is credible, the currency will not depreciate, or at least, it should quickly converge to the initial value. From the simulation result, currency depreciation cannot be prevented unless the interest rate increase is large. The currency can be prevented from depreciating in the current quarter only. Then it depreciates by 8.8 per cent in the first quarter, before stabilising at around 7.9 per cent. This indicates that a ten per cent increase in the interest rate can only offset about a 2.1 per cent expected depreciation. Thus, the hike is not credible.



**Figure 9.14.** *Impulse response function of the exchange rate to a ten per cent shock the in interest rate and expected depreciation*



## 9.7. Concluding remarks

The state of the Indonesian economy in the run up to the crisis indeed displayed a balance of payments vulnerability. This is indicated by the high ratio of debt service to total exports, the deficiency of foreign exchange reserves to cover liquid foreign liabilities, and currency mismatch. The sustainability of the balance of payments largely depended on the continuation of capital inflows. In short, the balance of payments was susceptible to a reversal of capital inflows.

The fact that the crisis did not occur earlier suggests the need to identify the trigger. The market pressure index demonstrates that there was no significant excess demand for foreign exchange that could have swept the country into a balance of payments crisis before July 1997. However, the index

indicates that market pressure during August 1997 was 27 times higher than the average pressure before the crisis, and so far, was the largest challenge to the authorities in maintaining the crawling peg. Four different triggers were identified, namely the slow down of capital inflows to the South East Asian region, and the increases in the expected depreciation, the perceived risk and the foreign interest rate.

The collapse of the exchange rate and the surge of capital outflows could have been prevented by increasing the domestic interest rate. However, the effectiveness of such policy was hampered by a fragile banking sector. Because the banking sector was weak, the hike was not feasible or credible. As we have emphasized, this inference is invariant to the fact that the banking sector was not the main debtor of foreign borrowing.

# **Chapter 10**

## ***Propagation of the Crisis***

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### **10.1. Introduction**

This chapter discuss the propagation of the crisis with particular emphasis on the role of the banking sector. The purpose is twofold:

- ❖ To highlight several features characterising the deepening of the crisis, such as monetary expansion, large depreciation, high inflation, export and import compression, and banking sector collapse.
- ❖ To examine interactions amongst macroeconomic variables that contributes to the severity of the crisis.

The remainder of this chapter is organised as follows. Section 10.2 is the chronicle of the deepening crisis, which began with the liquidation of 16 banks on 1 November 1997. Section 10.3 describes bank panics and loss of monetary control. Section 10.4 analyses key features of the macroeconomic adjustment process during the height of the crisis. Section 10.5 discusses transmission mechanisms for the propagation of the crisis, and section 10.6 concludes.

### **10.2. Chronology**

This subsection highlights several important events that occurred following the liquidation of 16 banks. These include increased political instability, bank runs, social unrest, and the collapse of the Soeharto regime. The list of events is presented in Table 10.1. The purpose is to set the scene for the further analysis that follows.

**Table 10.1.** *A Chronology of the Crisis Propagation, November 1997-July 1999*

Date	Event
1997	
1 November	Bank resolution package announced; 16 private banks closed; limited deposit insurance for the depositors
5 November	Three-year Stand-By Arrangement with IMF approved
Mid-December	Deposit runs on banks, totalled for about half of banking system assets.
1998	
15 January	Second IMF-supported program announced.
26 January	Indonesian Bank Restructuring Agency (IBRA) established and blanket guarantee announced.
Mid-February	President Suharto re-elected. Doubts about future of financial sector program grow stronger amid political uncertainty. Rupiah depreciates further and currency board is debated.
4 April	IBRA closes 7 banks and takes over 7 others.
Mid-May	Widespread riots, rupiah depreciates, deposit runs intensify, and Bank Indonesia must provide liquidity.
21 May	President Suharto steps down
29 May	A major private bank taken over by IBRA
5 June	International lenders and Indonesian companies agree on corporate debt rescheduling (only in principle)
Mid-July	Authorities allow market-determined interest rates on SBI
23 September	Indonesia's bilateral external debt to official creditors refinanced
30 September	Bank Mandiri created through merger of four largest state-owned banks. Plans announced for joint government-private sector recapitalisation of private banks.
6 October	Amended Banking Law passed, which included strengthening of IBRA
1999	
13 March	Government closes 38 private banks and IBRA takes over 7 others. Eligibility of 9 private banks for joint recapitalisation with government announced.
21 April	Closure of one joint-venture bank
30 June	Eight private banks recapitalised
5 July	Government announces plan for resolution of IBRA banks
31 July	Legal merger of component banks of Bank Madiri

Source: Adapted from Lindgren *et al* (2000)

Between November 1997 and January 1998, serious problems became evident, creating economic and political uncertainty. For instance Hill (1999, p. 9) describes the situation as:

Over this period, Indonesia's economic and political situation deteriorated sharply. The bank closures of November 1 triggered widespread uncertainty; backtracking on key reforms to preserve the Soeharto family interests was evident; ....and Soeharto was very ill for a week in early December (at one stage rumours of his death began to circulate). Indonesia then began to part company with other East Asian crisis economies, as its currency and stock market plummeted to new lows and its financial system virtually ceased to function. The government also began to lose control of the money supply, and hence inflationary pressures quickly surfaced. January 1998 was a truly dreadful month, with a series of devastating events....., which pushed the rupiah to as low as 17,000 (that is, one-seventh of its pre-crisis level).

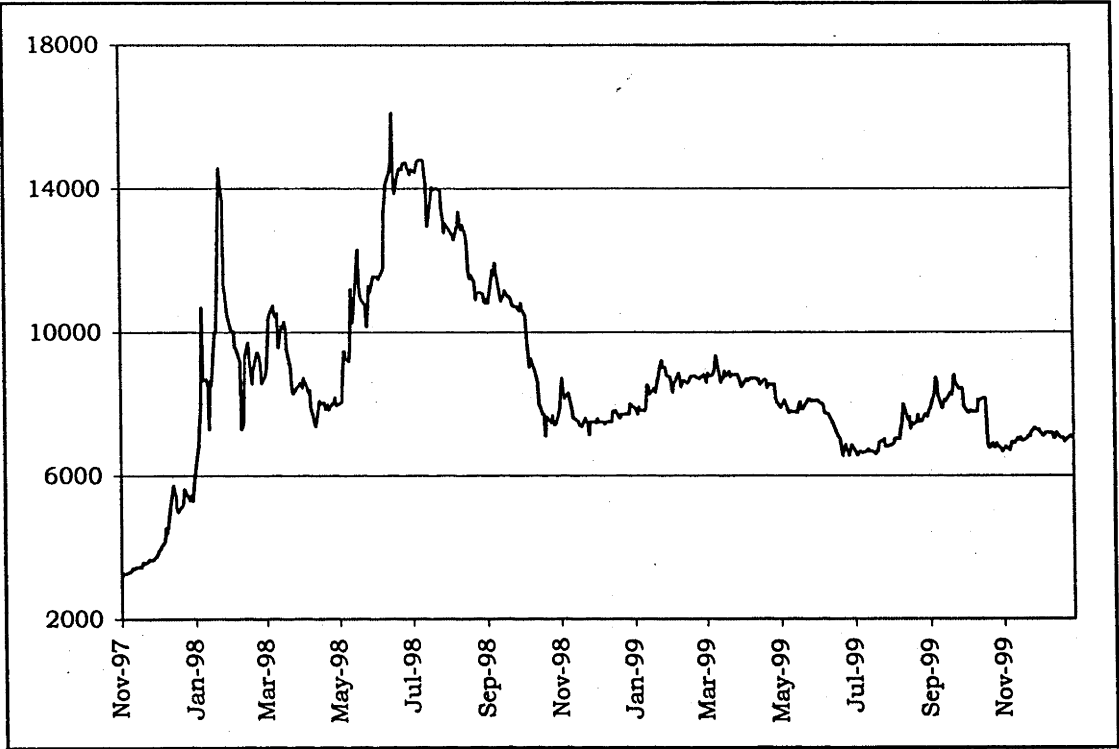
January to April 1998 could be called a period of wasted opportunities. There were some sign of (minor) improvement and optimism. The exchange rate and stock price index began to strengthen a little, but were still very volatile. However, this was spoiled by uncertain policy response, and lack of commitment for major economic reforms. The President toyed with the controversial currency board system (CBS), violated the LOI with the IMF, and dismissed the Governor of BI. Moreover, the market seriously doubted the resolve for major economic reform, as the President's eldest daughter, Tutut, and his crony, Bob Hasan, were included in the new cabinet.

In May 1998, the situation was chaotic, and law and order practically non-existent. Student protests became frequent and larger. After the shooting of students at Trisakti University, a major Jakarta campus, students occupied the Parliament, and looting and social violence followed. Many wealthy ethnic Chinese and expatriates escaped the country. The political crisis culminated when after 32 years in complete command of the country the President finally stepped down on 22 May 1998. On the same day, Dr. Habibie was installed as the third President of the republic.

Market confidence in the new president was weak. Between mid June and July 1998, the rupiah stayed at above the 14,000 levels, and then

gradually strengthened. The political situation continued to be hostile, partly owing to the fact that Habibie was seen as being part of Soeharto's circle.

**Figure 10.1.** *Exchange rate movement, November 1997-December 1999 (\$/Rp)*



Source: University of British, Columbia Pacific Database

The third President survived his first 100 days in office, and some optimism sprouted. The economic team under the coordinating minister of economic and finance, Ginandjar Kartasasmita, appeared to be pragmatic and cooperative with the Fund. The currency reached the 7,000 levels on 21 October 1998 and then seemed to stabilise around 7,500 and 8,000.

However, the economy continued to slump until December 1998. In the last quarter of 1998 the GDP contracted by 17 per cent compared with a year earlier.

## **10.3. Monetary expansion and bank panic**

### **10.3.1. Bank panic and guarantee**

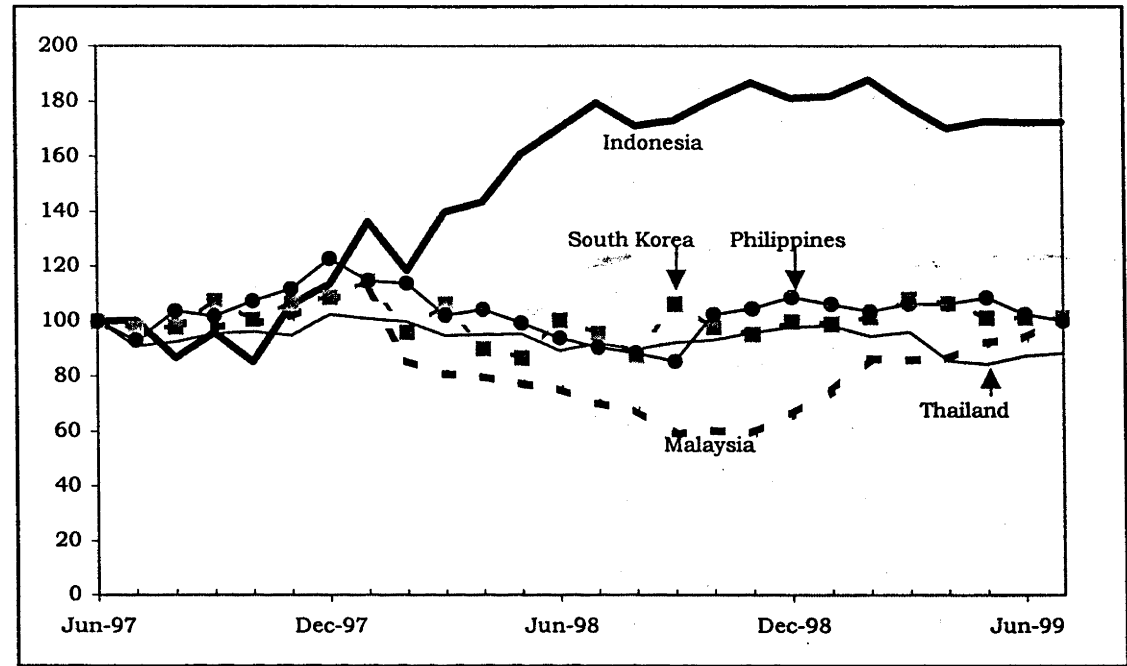
The process leading to the deepening of the crisis began with the inability of the authorities to control money supply. Indonesia's base money began to increase remarkably from December 1997, following a series of bank runs, which were probably triggered by the closure of 16 banks in November. Unlike Indonesia, the other crisis countries managed the money supply very well (see Figure 10.2). In this regard, Indonesia is the exception which may help explain the calamity that followed. For instance Hill (1999, p.33) rightly described the situation as:

(t)he crisis began to feed on itself. In addition to the mounting political uncertainty, the loss of monetary control contributed to rapidly increasing inflation and the collapse of the rupiah. ...., the expansion of base money can be linked both directly to bank bail-outs (among which the well-connected were well-treated) and more generally to a sense of panic on the part of the monetary authorities. Monetary policy management was complicated not only by the financial and political crisis but also by the exchange rate crisis. Indonesian residents switched increasingly to foreign currency deposits (which are legal), thus complicating the task of money supply targeting. .... Indonesia was without parallel among the crisis economies. Despite large currency depreciations, the other economies kept the money supply firmly under control, and inflation to single digit levels in both 1997 and 1998.

The problem was that the authorities had to bail out troubled banks. The bail out took two forms; liquidity support and blanket guarantee. By providing an overdraft facility against the central bank, liquidity support aims to stabilise banks' day-to-day cash flow and prevent a sudden break down of the banking system. The support is referred to BLBI (Bantuan Likuiditas Bank Indonesia, or liquidity support from Bank Indonesia) and an extension of KLBI (Kredit Likuiditas Bank Indonesia, or liquidity credit from Bank Indonesia). Lindgren *et al* (2000) estimated that by June 1998 the size of such support was

about Rp 170 trillion, or about 17 per cent of GDP.<sup>1</sup> This can be compared to the December 1997 figure of only about Rp 60 trillion.

**Figure 10.2.** Trends in reserve money in the crisis countries  
(Indices, June 1997 = 100)



Source: IMF, *International Financial Statistics* database.

Due to panic runs, a blanket guarantee was announced on 26 January 1998. Such a guarantee was intended to restore public confidence in the banking system, and conserve the stability of the payment system. This involved a commitment by the government to honour banks' third party liabilities, excluding liabilities to shareholders, subordinated debts, and insiders' deposits.<sup>2</sup> By the end of 1999, the blanket guarantee totalled about Rp 54 trillion.

The main idea for providing a bail out is to short circuit the vicious circle between panic runs and increased banking fragility. A deterioration in banking

<sup>1</sup> The latest estimate for the figure is Rp 165 trillion (*Detik.com*, 23 August 2000).

<sup>2</sup> Insiders include bank owners, managers, and affiliates.



conditions can induce panic runs, which further worsen banks' financial positions. If runs can be prevented, further complications can also be avoided, and banking problems can be worked out more easily. Moreover, liquidity support can reduce systemic risks (i.e. a bank fails because another fails to service inter-bank liabilities).

The runs on private domestic banks began after the liquidation 16 banks in November 1997. There were some problems in the process of liquidation that induced panic. These problems were:

- ❖ Larger depositors were not protected against losses associated with bank closure. Only deposits of not more than Rp 20 million were fully saved by the government. Although this protection covered over 91 per cent of depositors, it only covered 20 per cent of total deposits (Lindgren 2000). The problem was that larger depositors were amongst those who were aware of foreign exchange risk and whose capital was mobile (i.e. they had more access to offshore transactions). Given this, panic might have not only been induced by increased banking fragility, but also by anticipated currency depreciation. In effect, bank runs would induce capital flight.
- ❖ There was no assurance from the authorities that more banks would not be closed. This, and the lack of full guarantee, induced a perception (especially amongst larger depositors) that they were facing further losses.<sup>3</sup>
- ❖ The criteria for the closures were not sufficiently clarified to the public, and it was widely known that several other banks were also insolvent. Prior to the liquidation, irresponsible parties circulated lists of 48 to 56 banks under consideration for closure. Though they included different lists of banks, the 16 banks were apparently included in almost all lists, fuelling the perception that the lists contained some truth (i.e. more banks were considered, but for various reasons only 16 were finally closed).

- ❖ The credibility of the initial intention (i.e. disciplining banks) was spoiled by permitting Bambang Trihatmodjo – one of the President's sons and the owner of one of the liquidated banks, Bank Andromeda – to acquire a major share in Bank Alfa. This may have precipitated the perception that policies to resolve the crisis would be subordinated by a desire to protect the 'family'.

In short, the liquidation was not able to restore public confidence, and may have even provoked the subsequent runs. Moreover, there are two other factors that can help explain the panic:

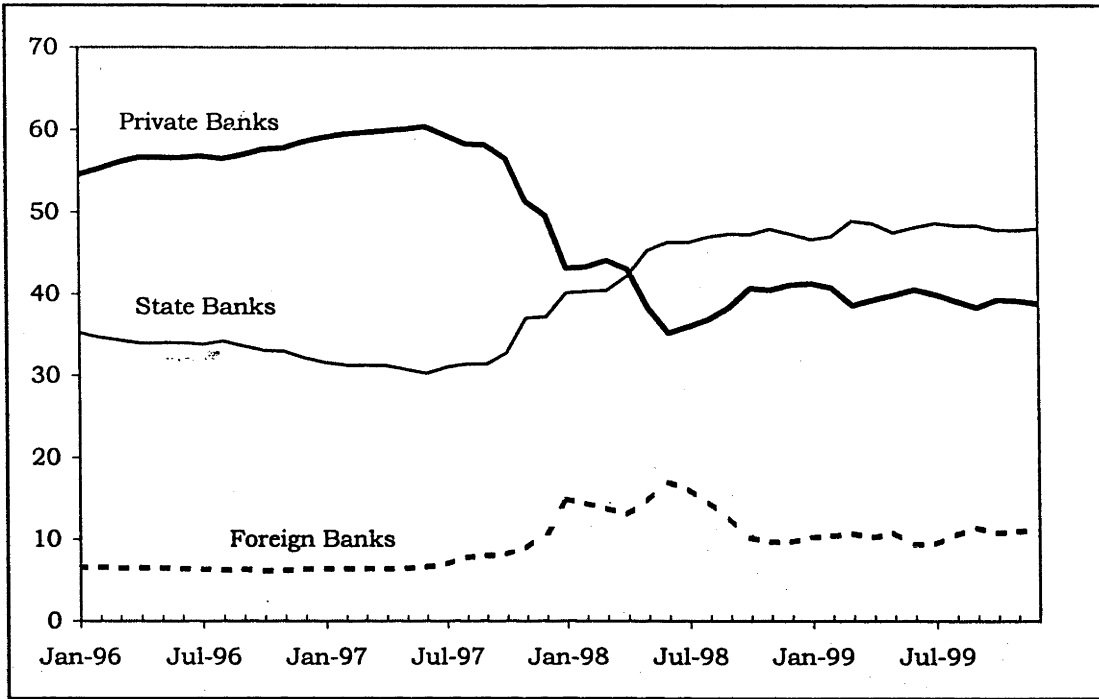
- ❖ Depositors had 'painful' memories regarding bank closure, due to the losses incurred by the liquidation of Bank Suma several years earlier. Small depositors were fully honoured, but the procedure to claim the deposits was complicated. Moreover, the liquidation of assets was very slow and highly politicised, creating uncertainty for larger depositors.
- ❖ A substantial number of depositors might have been aware of the incoming problems in the private banks after the break out of the crisis. Figure 10.3 suggests that the share of deposits in private banks declined from August 1997. This is in contrast to the pre-crisis trend, where the share of private banks tended to increase while that of state banks tended to steadily decrease.<sup>4</sup> This suggests there was a tendency to reduce funds allocated to private banks as a precautionary step to minimise potential risks (i.e., a flight to safety). In effect, the November closures were a vindication that their perceptions had been correct. After that, depositors began to withdraw in large amounts, most of which was re-deposited in state and foreign banks. The share of deposits in state banks increased from 33 per cent in October 1997 to 46 per cent in June 1998. During the same period, the share of foreign banks increased from 8 to 17 per cent. Meanwhile, the private banks' share decreased from 57 to 25 per cent.

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<sup>3</sup> See also Lane *et al.* (1999) on this issue.

<sup>4</sup> See section 3.5 for detailed discussion about the pre-crisis development.

**Figure 10.3.** *The share of deposits in private state and foreign banks, 1996-1999 (% of total deposits)*



Source: BI, Indonesian Financial Statistics.

In order to restore public confidence, a blanket guarantee was then introduced in January 1998. As seen in Figure 10.3 the guarantee could not recover the loss of confidence in private banks. Through to July 1998, the private banks' share continued to decline. However, it is safe to say that bank runs could have been even more severe without this guarantee. There are four factors that weakened the guarantee's credibility and effectiveness.

First, the economic crisis began to feed on the political crisis and social unrest, increasing the perceived country risk. Hill (1999, p.19) describes this as:

(T)here are frequent media and anecdotal reports of dislocation, hardship and violence among local communities and families. The state of law and order and order certainly appears to have deteriorated markedly. Crime is reported to be rising sharply.

..... Looting of containers in the ports, factories and shops is souring the commercial environment. .... . The dominant ethnic Chinese business community continues to be a prime target, but they are by no means the only ones. No doubt rising poverty and unemployment have been a factor in all this. Political paybacks have been another factor in the equation, as those who felt mistreated by officialdom during the Soeharto era have sought to level the score.

The economic, political and social crises culminated in May 1998, with widespread riots. Students flooded the streets and occupied the parliament building, demanding the end of the regime. Bank runs intensified, the rupiah continued to depreciate, wealthy ethnic Chinese fled the country, and finally, President Soeharto stepped down.

Second, domestic agents may have anticipated increased banking fragility and its implications for real economic activities and government budgets. If this is so, an anticipation of a possible breakdown of the banking system would lead agents to cast doubt on the ability of the government to carry contingent liabilities, i.e. a guarantee means banks' liabilities become the government's. Large depreciation and high interest rates may have induced such anticipation. The subsequent withdrawals of deposits, which led to monetary expansion, continued currency depreciation, and capital flight, made such expectations self-fulfilling.

Third, the guarantee was not accompanied by strict control on capital outflows. As discussed in section 9.3, at the onset of the crisis foreign exchange reserves were not sufficient to cover liquid foreign liabilities. The explicit guarantee entails a further burden on the balance of payments as deposit withdrawals can be readily translated into capital flight. As of December 1997, M2 was about five times foreign exchange reserves, suggesting a deficiency of liquid assets to cover contingent liabilities.<sup>5</sup> Because of this, the deposit guarantee was not credible. At the height of the financial and political crisis, the issue of capital (outflow) control became relevant, because it provided two functions: (1) eliminating the benefit of transferring financial resources

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<sup>5</sup> Calvo and Mendoza (1996) emphasise the potential sudden collapse in M2, not the size of M2 per se.

abroad, and (2) increasing the cost of hoarding cash. These can reduce the willingness to withdraw deposits. If the proceeds from bank runs cannot be transferred abroad, agents must hoard money or spend it. This induces inflationary pressure, increasing the cost of holding money. If this were anticipated, some depositors would rather not make runs.

Fourth, the guarantee may have induced moral hazard problems: some banks might have increased the 'bet' in order to recover existing losses. For instance, before its collapse Bank Dagang Nasional Indonesia (BDNI), one of the private banks notorious for its poor management, was involved in foreign exchange transactions (mainly in the form of 'margin trading') with Bank Bali. The claims on BDNI from these transactions were estimated to be Rp 598 billion (*Kompas*, 16 August 1999). The bank was finally closed on 4 April 1998.

### **10.3.2. Interest rate hike**

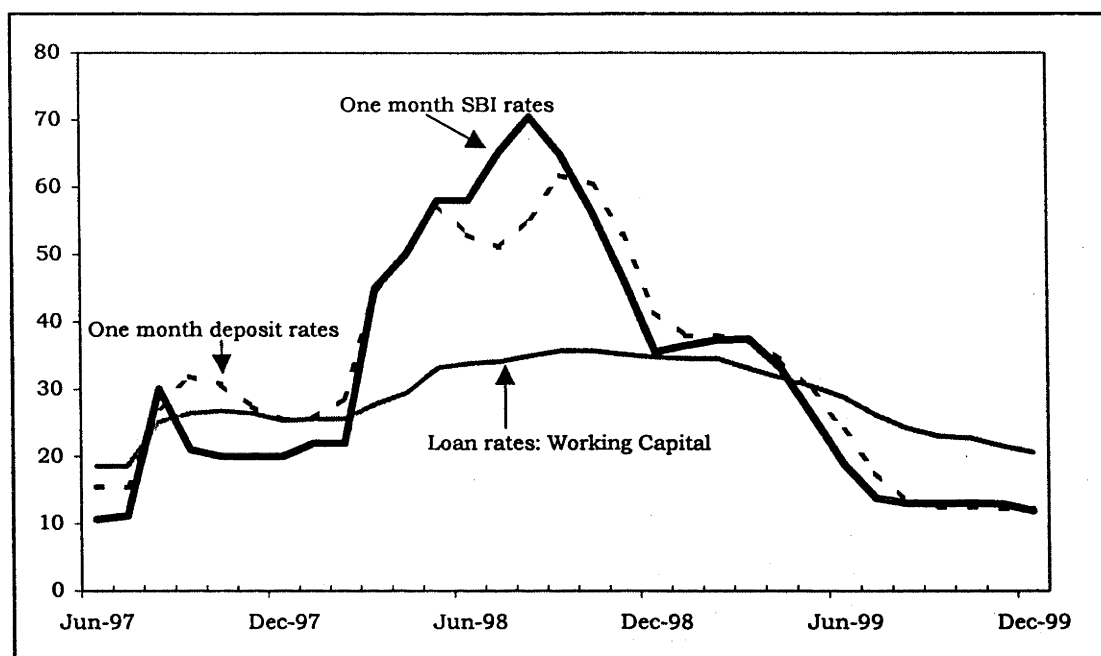
Because the guarantee was not credible and liquidity support continued, the management of money supply became increasingly complicated. It should have been possible to prevent expansion in reserve money by increasing interest rates. The authorities did increase the interest rate in March 1998, and this was continued until May 1999 (see Figure 10.4). The one-month SBI rate increased from 22 to 45 per cent in March 1998, and reached a peak in August (70 per cent).<sup>6</sup> The average one-month deposit rate also increased, but the loan rate (working capital loan) was not fully adjusted to the same extent as the deposit rate.

Even with this ultra high interest rate, money stubbornly increased until July 1998. It did stabilise after that, but did not reverse to the extent achieved in the other crisis countries (see Figure 10.2). In other words, the interest rate hike failed to reduce the money supply.

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<sup>6</sup> SBIs (Bank Indonesia Certificates) are issued to reduce money supply.

**Figure 10.4.** *Interest rates, 1997-1999 (%)*

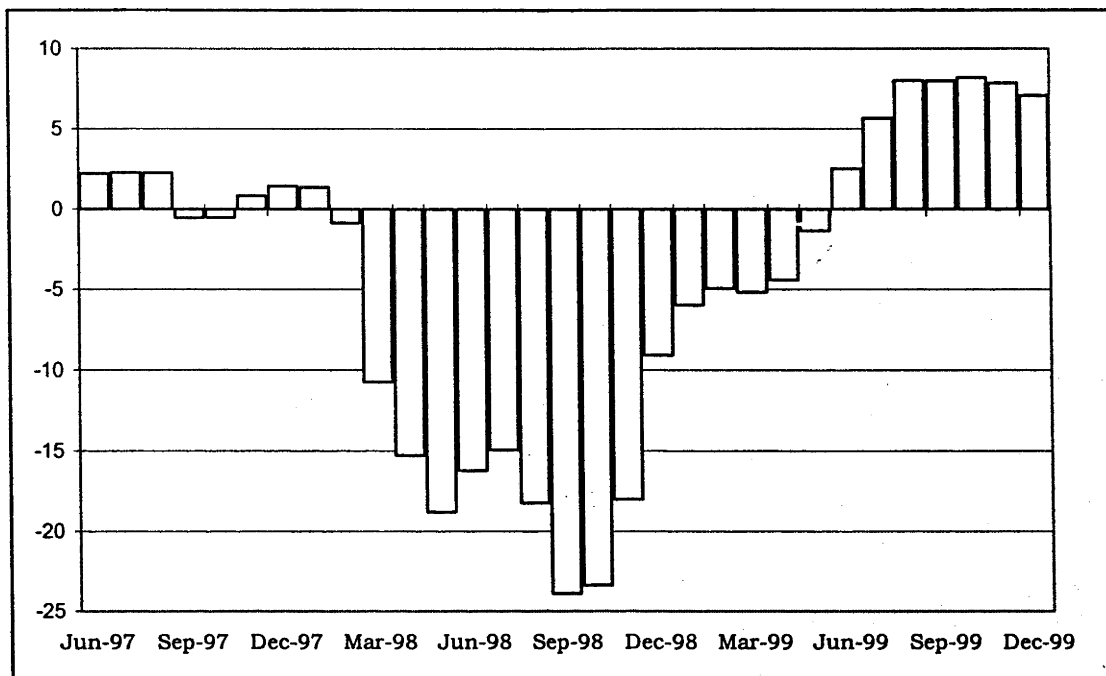


Source: BI, Indonesian Financial Statistics.

The impact of such a hike on banks was costly. Banks could not fully adjust their lending rates as high as deposit rates, due to the fear of non-performing loans. They could have increased lending rates, but no one could afford to pay back the loans. On the other hand, banks had to compete against each other to attract deposits and maintain existing ones. In effect, banks suffered a negative net-interest margin.

Figure 10.5 presents the spread between average lending and deposit rates. The average lending rates are calculated as a weighted average of rates charged on working capital and investment loans. The average deposit rates are a weighted average of time deposit rates with a maturity of between 1 and 24 months. The figure shows that banks suffered negative spreads for about 16 months, from February 1998 to May 1999. This was in addition to the previous negative spread that occurred during September and October 1997, which was the result of the tight money policy introduced in August 1997. For about 8 months, the negative spread was above 15 per cent. It peaked in September 1998 at about - 24 per cent.

**Figure 10.5.** *The spread between lending and deposit rates (%)*



Source: Calculated from Indonesian Financial Statistics, BI.

It is fair to say the high interest rate policy further weakened an already defunct banking system. It directly induced further losses for banks, and consequently increased the need for bail out (see the discussion in section 9.6 on the effect of the interest rate rise on bank bail out). Because of this, it was not effective in reducing the money supply.

## **10.4. Macroeconomic Adjustment**

### **10.4.1. Inflationary pressure and real exchange rate**

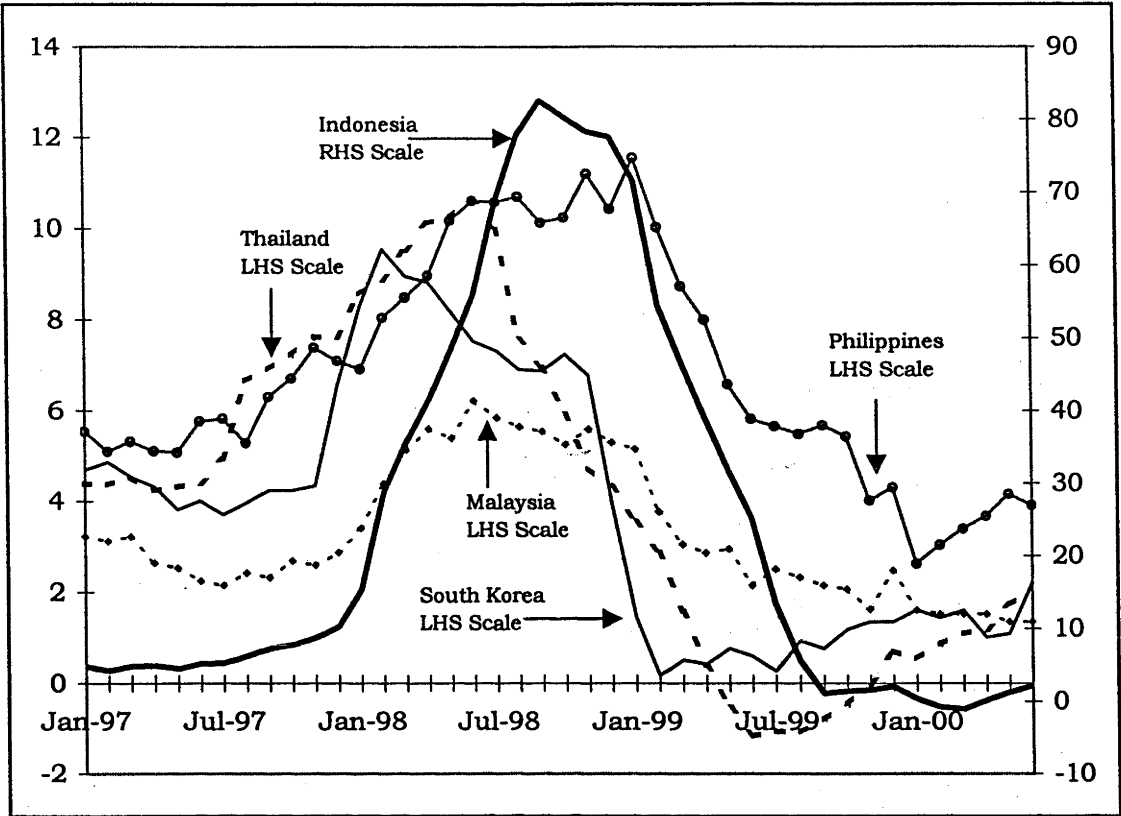
Because it was difficult to control reserve money, the results were entirely expected: further currency depreciation and heightened inflation. During the tumultuous days of January 1998, the exchange rate broke the 10,000 and 15,000 psychological levels on the 8<sup>th</sup> and 23<sup>rd</sup> of that month (see Figure 10.1). Between February and April 1998, the exchange rate strengthened to around the 8,000 levels. However, political uncertainty, social unrest and the bank runs that occurred in May 1998, pushed the currency down. The exchange rate touched its lowest level of 16,000 on 17 June 1998. The exchange rate collapse was partly due to the exodus of wealthy ethnic Chinese following violence against them. As political and social tensions declined, monetary stabilisation became easier. From October 1998, the exchange rate stabilised at around 8,000, and this was maintained throughout 1999.

Money expansion and the large exchange rate depreciation increased the inflation rate during 1998. As seen in Figure 10.6, the inflation rate soared to 82 per cent by September 1998. The inflation rate for the whole year was about 57 per cent, or about 8 times the pre-crisis inflation rate. This high inflation rate was caused not only by monetary expansion and exchange rate depreciation, but was compounded by the increase in food prices. A severe drought in 1997 caused by the 'El Nino' effect decreased food production.

The relatively uncontrolled money supply led Indonesia's inflation to depart from the other crisis countries. Malaysia, which was able to exercise monetary tightening, has been able to maintain the inflation rate below 7 per cent, and its 1998 inflation rate was only 5.3 per cent, the lowest amongst the crisis countries. Although their inflation rate exceeded the two-digit level for several months, Thailand and the Philippines' 1998 inflation rates remained just below 10 per cent. Korea was also able to achieve a relatively low inflation rate of 7.5 per cent.



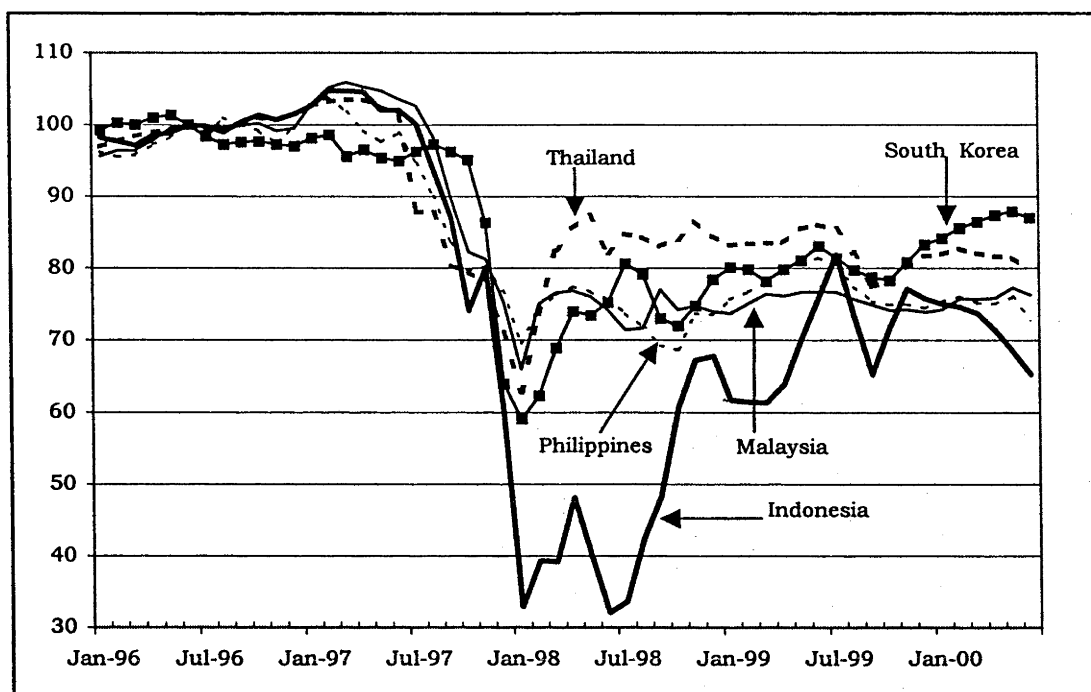
**Figure 10.6.** Inflation rates in crisis countries, 1996-2000 (% , year-on-year).



Source: International Financial Statistic Database, IMF

Despite its large currency depreciation, Indonesia's real exchange rate was almost at par with the other crisis countries' in mid 1999 (see Figure 10.7). The large real depreciation that occurred between August 1997 and January 1998 made the country twice as competitive as its neighbours. From July 1998, the inflation rate heightened, which led to a sharp real appreciation and loss of competitiveness. One year later, Indonesia was as competitive as Malaysia and the Philippines. This stresses that inflation management is important to maintaining competitiveness of tradable goods. As will be discussed later in section 10.5, a defunct banking system wasted the gain that could have been obtained from the real depreciation that occurred in 1998.

**Figure 10.7.** Real exchange rates, June 1997=100



Source: JP Morgan

#### **10.4.2. Output and expenditure**

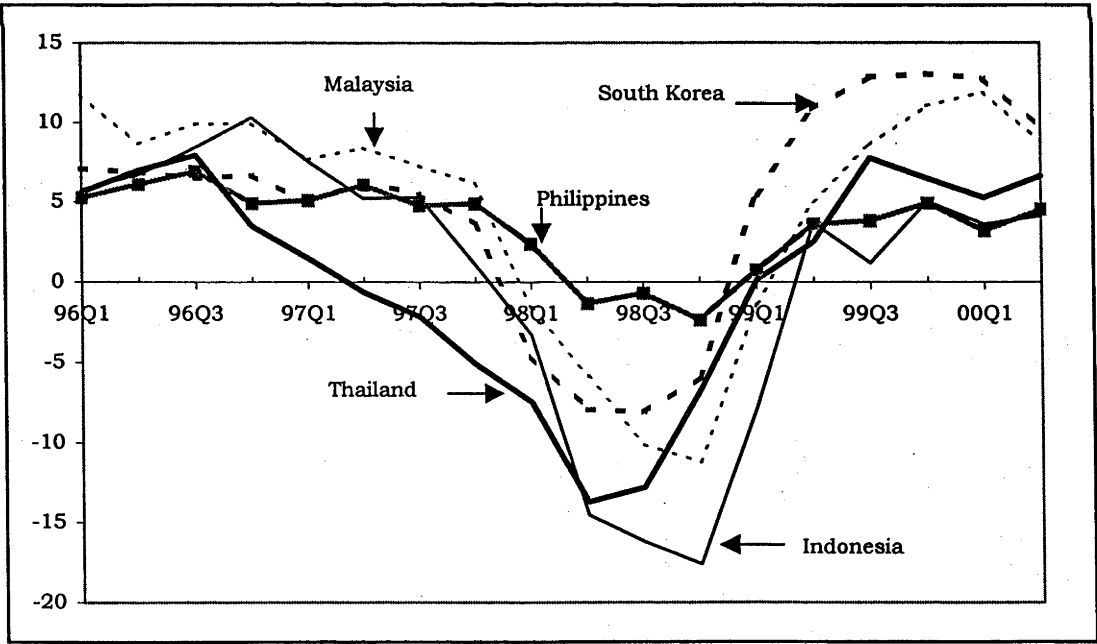
A combination of high interest rates and large depreciation caused GDP to shrink sharply in 1998, by 13.4 per cent. Note that, in 1997, Indonesia was still able to maintain positive growth of about 4.7 per cent. The biggest contraction occurred in the fourth quarter of 1998, when output was about 18 per cent lower than the same quarter of previous year. Output continued to decline by 8 per cent in the first quarter of 1999, and then began to grow slowly but steadily. The second quarter of that year recorded positive growth for the first time, and GDP for the whole of 1999 was just 0.3 per cent above the 1998 level. Growth for the first semester of 2000 was just about 4 per cent, confirming that a recovery is now underway.

Compared to the other four crisis countries, Indonesia's recession was by far the worst (see Figure 10.8). The closest match was Thailand, where output shrank by more than 10 per cent in 1998. However, this country experienced

recession earlier, from the second quarter of 1997. Adding the 2 per cent contraction in 1997, Thailand was almost as bad as Indonesia. The Philippines performed far better than the others, with a GDP contraction of about 1 per cent in 1998.

In terms of recovery, Indonesia was approximately one quarter behind the other crisis countries. The fastest recovery has been recorded by South Korea (10 per cent growth in 1999). Malaysia is catching up, with growth for the whole of 1999 of just below 6 per cent. Malaysia's growth rate for the first semester of 2000 was about 9 per cent. It seems that for these two countries the signs of recovery are particularly strong. Thailand's growth in 1999, and in the first semester of 2000, was just above 4 and 5 per cent. The Philippines' growth exceeded the 3 per cent level in 1999, and, considering the lower level of pre-crisis growth (compared with the others), it is probably safe to assume that pre-crisis growth can again be achieved. Though its pre-crisis performance was better, Indonesia is still catching up to the Philippines' post-crisis growth level. Therefore, it is clear that the Indonesian recovery is slower than the others.

Figure 10.8. *Output growth of the crisis countries, 1996-2000 (% , year-to-year)*



Source: IMF, *International Financial Statistics* database.

Amongst the components of domestic absorption, investment spending was by far the most adversely affected (see Table 10.2). Adjustment in investment occurred by reduction in both change in stocks and fixed capital formation, but the former was adjusted more quickly and drastically.<sup>7</sup> Total investment spending in 1998 fell by about 46 per cent from the 1997 level. The 1998 drop in government spending (15 per cent in real terms) also added to contractionary pressures. Surprisingly, household consumption fell by only 2 per cent during that year. In effect, domestic absorption shrank by 17 per cent, or about 4 per cent more than output contraction.

In 1999, while investment continued to decline, government and private consumption began to pick up. Total consumption increased by 0.5 per cent in that year, giving marginal relief to the economy. Thus, the positive growth in GDP was driven by consumption.

In the first semester of 2000, output growth was also largely driven by consumption. During this period, consumption increased by about 3 per cent. Fixed capital formation began to grow but, because the change in stocks was still negative, a positive investment level has not yet emerged.

Exports and imports began to fall sharply in the fourth quarter of 1998, but the fall in imports was larger. For the whole of 1998, exports maintained a vigorous growth of about 11 percent, then collapsed massively by 32 per cent in 1999, before growing strongly again (by 21 per cent) in the first semester of 2000. Import growth was inverted from 15 per cent in 1997 to minus 5 per cent in 1998. It further collapsed by 41 per cent in 1999. The imports level in the first quarter of 1999 was just about 46 per cent of the previous year.

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<sup>7</sup> Bernanke and Gertler (1995) emphasise that the change in stocks is most responsive to a contractionary shock.

**Table 10.2. National Account, 1997-200***(1993 prices Rp trillion, figures in italics are indices 1996=100)*

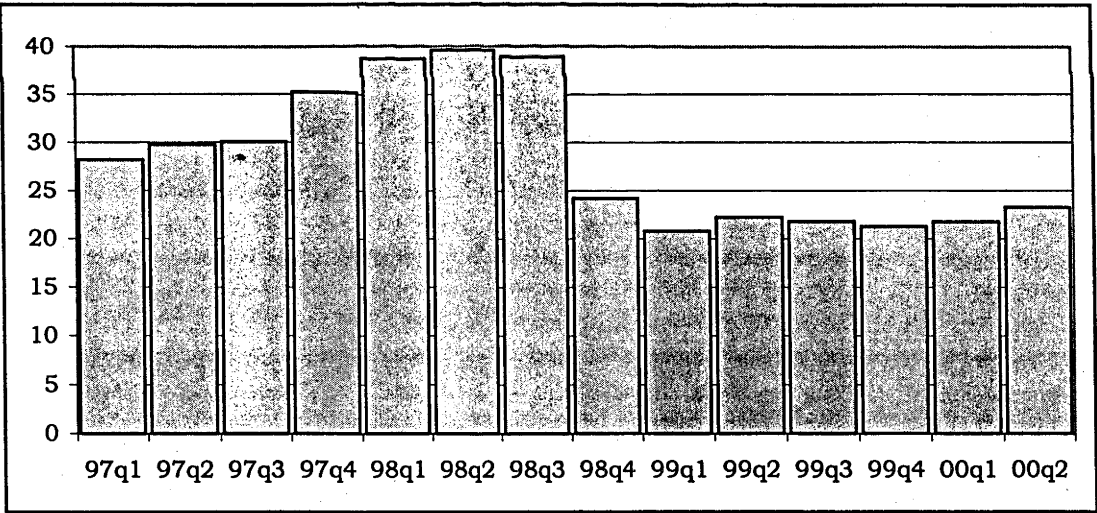
	<b>97q1</b>	<b>97q2</b>	<b>97q3</b>	<b>97q4</b>	<b>98q1</b>	<b>98q2</b>	<b>98q3</b>
Household consumption	66.2 <i>102</i>	67.5 <i>104</i>	68.2 <i>105</i>	72.0 <i>111</i>	69.2 <i>107</i>	68.5 <i>105</i>	63.8 <i>98</i>
Government consumption	8.3 <i>105</i>	7.1 <i>90</i>	7.7 <i>97</i>	8.6 <i>108</i>	7.1 <i>90</i>	6.6 <i>84</i>	6.2 <i>79</i>
Gross fixed capital formation	34.2 <i>106</i>	35.4 <i>110</i>	36.3 <i>113</i>	33.8 <i>105</i>	25.4 <i>79</i>	22.0 <i>69</i>	22.9 <i>71</i>
Change in stock	3.4 <i>358</i>	1.5 <i>157</i>	-0.2 <i>-17</i>	2.7 <i>282</i>	-1.0 <i>-101</i>	-5.9 <i>-624</i>	-2.5 <i>-267</i>
Exports of goods & services	25.0 <i>89</i>	29.0 <i>103</i>	31.7 <i>113</i>	35.5 <i>126</i>	39.3 <i>140</i>	35.3 <i>126</i>	38.9 <i>139</i>
Imports of goods & services	31.6 <i>104</i>	33.2 <i>109</i>	33.7 <i>111</i>	41.3 <i>135</i>	39.0 <i>128</i>	36.1 <i>119</i>	35.2 <i>115</i>
GDP	105.4 <i>102</i>	107.3 <i>104</i>	110.1 <i>106</i>	111.3 <i>107</i>	101.1 <i>98</i>	90.4 <i>87</i>	94.1 <i>91</i>
	<b>98q4</b>	<b>99q1</b>	<b>99q2</b>	<b>99q3</b>	<b>99q4</b>	<b>00q1</b>	<b>00q2</b>
Household consumption	66.4 <i>102</i>	66.8 <i>103</i>	67.1 <i>103</i>	67.4 <i>104</i>	67.8 <i>104</i>	68.5 <i>106</i>	68.8 <i>106</i>
Government consumption	6.9 <i>87</i>	6.8 <i>86</i>	7.3 <i>92</i>	6.2 <i>78</i>	6.7 <i>84</i>	7.0 <i>89</i>	7.5 <i>94</i>
Gross fixed capital formation	19.7 <i>61</i>	18.5 <i>57</i>	18.0 <i>56</i>	18.1 <i>56</i>	20.3 <i>63</i>	21.1 <i>66</i>	21.8 <i>68</i>
Change in stock	-1.7 <i>-175</i>	-1.4 <i>-152</i>	-0.1 <i>-13</i>	-0.8 <i>-86</i>	-4.2 <i>-446</i>	-5.6 <i>-591</i>	-6.5 <i>-681</i>
Exports of goods & services	21.2 <i>75</i>	22.2 <i>79</i>	22.1 <i>79</i>	24.0 <i>86</i>	23.8 <i>85</i>	26.1 <i>93</i>	27.4 <i>98</i>
Imports of goods & services	22.1 <i>73</i>	18.9 <i>62</i>	20.5 <i>67</i>	19.8 <i>65</i>	19.3 <i>63</i>	19.8 <i>65</i>	21.3 <i>70</i>
GDP	90.4 <i>87</i>	94.0 <i>91</i>	93.8 <i>91</i>	95.1 <i>92</i>	95.1 <i>92</i>	97.4 <i>94</i>	97.7 <i>94</i>

Source: BI, *Indonesian Financial Statistics*.

Since the real exchange rate was favourable for exports, it is surprising that they experienced a plunge before bouncing back. Hill (2000) puts the blame on several factors: cancelled export orders owing to supply uncertainties, companies had difficulties in obtaining trade finance, shipping bottlenecks following the sharp fall in imports, supply disruptions caused by localised outbreaks of looting and poor law and order, and the reduced presence of (the more export-oriented) MNCs.

The fact that the import implosion was larger than the contraction in domestic absorption suggests expenditure switching from importables to domestically produced goods. This phenomenon is a common effect of devaluation. Because importables became more expensive, their share in consumption and investment spending decreased (see Figure 10.9). In the last quarter of 1998, the share of imports in domestic absorption fell massively, from 39 to 24 per cent. From there on, it stabilised at around 22 per cent.

**Figure 10.9. Expenditure Switching:**  
*Share of Imports in Total Domestic Absorptions (%)*



Source: Calculated from CEIC database, Hong Kong

### **10.4.3. Balance of payments**

With the surge in capital outflows, it became increasingly difficult to avoid a full-blown crisis. Between the last quarter of 1997 and the first quarter of 2000, the exodus of private financial resources amounted to about \$ 34 billion, almost half of which was in the first two quarters of that period (see Table 10.3).<sup>8</sup> The \$34 billion figure is equivalent to total private capital inflows during the four years leading up to the crisis. Capital outflow pressure was particularly massive in the first quarter of 1998, causing the balance of payments to record an historic lowest level (deficits of around \$17 billion).

Around 86 per cent of the outflows was due to 'short-term' private capital. The main component of this capital is classified as 'other investment' (56 per cent), which suggests a large fraction of domestic residents' financial resources were being transferred abroad. The rest of the short-term capital consists of portfolio capital (32 per cent) and bank liabilities (12 per cent). The massive exodus of mobile capital is not surprising given the panic of 1997 and the political chaos and social unrest of 1998.

Although the magnitude is much smaller than the mobile capital flight, a continuous negative FDI flows for five semesters represents far deeper problems. Hill (2000 p.15) put this as:

(W)hat is in some respects more worrying still is the trend in FDI, which responds to longer-term and more sober assessments of an economy's prospects. Here Indonesia is a complete outlier among the five East Asian crisis economies. From being the largest recipient of FDI in 1996, and nearly so in 1997, it is estimated to have been the only one to experience a net outflow in 1998. The contrast with the two other economies under an IMF crisis program is particularly noticeable, since FDI inflows to both almost doubled. They underline again that Indonesia's situation is much more precarious, that East Asia's large cash-rich 'Chinese' investors (i.e., Hong Kong, Singapore, and Taiwan) are shunning Indonesia, and that its recovery will be much slower.

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<sup>8</sup> The \$34 billion figure excludes errors and omissions.

**Table 10.3.** *Composition of Balance of Payments, 1997:Q2-2000:Q1 (\$ billion)*

	97Q2	97Q3	97Q4	98Q1
Exports	14.7	14.4	14.2	12.8
Imports	-11.3	-12.2	-11.3	-8.0
<i>Merchandise Trade Balance</i>	3.5	2.2	3.0	4.8
Services (net)	-4.6	-3.6	-3.2	-3.8
<i>Current Account</i>	-1.1	-1.4	-0.2	1.0
Direct Investment	1.3	1.4	-0.3	-0.5
Official Capital	0.4	-0.2	3.2	0.9
<i>Basic Balances</i>	0.5	-0.2	2.6	1.4
Short-term private capital	0.6	0.6	-8.3	-6.6
Errors and Omissions	0.1	-1.0	2.5	-12.2
<i>Overall Balance</i>	1.2	-0.6	-3.1	-17.4
Memo item:				
Capital Account Balance	2.2	1.8	-5.4	-6.2
	98Q2	98Q3	98Q4	99Q1
Exports	13.2	13.5	10.9	10.8
Imports	-8.2	-8.4	-7.3	-6.8
<i>Merchandise Trade Balance</i>	5.0	5.1	3.5	4.0
Services (net)	-4.3	-3.4	-2.9	-2.5
<i>Current Account</i>	0.7	1.7	0.7	1.5
Direct Investment	0.4	-0.1	-0.1	-0.2
Official Capital	2.2	3.3	3.6	3.5
<i>Basic Balances</i>	3.3	4.8	4.2	4.7
Short-term private capital	-1.4	-3.5	-2.0	-2.6
Errors and Omissions	0.2	0.7	1.0	-0.1
<i>Overall Balance</i>	2.1	1.9	3.2	2.0
Memo item:				
Capital Account Balance	1.2	-0.4	1.5	0.6
	99Q2	99Q3	99Q4	00Q1
Exports	12.4	14.3	13.8	15.1
Imports	-7.9	-7.9	-8.0	-8.8
<i>Merchandise Trade Balance</i>	4.5	6.3	5.8	6.3
Services (net)	-3.6	-4.5	-4.3	-4.4
<i>Current Account</i>	0.9	1.9	1.5	1.9
Direct Investment	-0.9	-0.7	-0.9	-1.5
Official Capital	1.2	0.6	0.1	1.3
<i>Basic Balances</i>	1.2	1.8	0.7	1.7
Short-term private capital	-1.2	-2.0	-1.4	-0.5
Errors and Omissions	0.7	0.6	0.9	1.6
<i>Overall Balance</i>	0.8	0.4	0.2	2.8
Memo item:				
Capital Account Balance	-0.8	-2.1	-2.2	-0.7

Source: BI, *Indonesian Financial Statistics*.



Around 58 per cent of these private capital outflows was offset by the net official capital inflows, and these included part of the IMF bail out program.<sup>9</sup> The Fund itself contributed only half of these official capital inflows. It is fair to say that if the bail out package had been more quickly disbursed the pressure on the balance of payments could have been lessened. Hence, exchange rate overshooting and its adverse consequences could have been avoided. The slow release of the package was partly caused by difficulties in meeting the conditionality requirements and the reluctance of the Soeharto regime to implement the program.

Another important source of financing of capital flight is the improvement in current account balances owing to an import compression rather than an exports expansion. The current account was quickly inverted from historically always being negative to a positive figure (above \$1 billion) in the first quarter of 1998. Thereafter, positive balances were maintained. However, as discussed, export performance has been somewhat disappointing, at least until 2000, and here also Indonesia's record was poorer than that of the other crisis countries. In nominal dollar terms, exports began to decline from the end of 1997, before strengthening again at the end of 1999. Some 60 per cent of the decline was due to the sharp oil price decline (Hill 2000).

#### **10.4.4. Banking sector**

The banking sector problem was part cause and part consequence of the fact that the recession was so deep. The sector was by far the worst hit by the crisis. The sector's value added shrank by 65 per cent in the last quarter of 1998, which coincided with the largest contraction of the GDP. For the whole of 1998, the sector recorded an average contraction of about 38 per cent, or almost three times that of the average contraction in other sectors. While GDP began to show marginal positive growth in 1999, the banking system was still

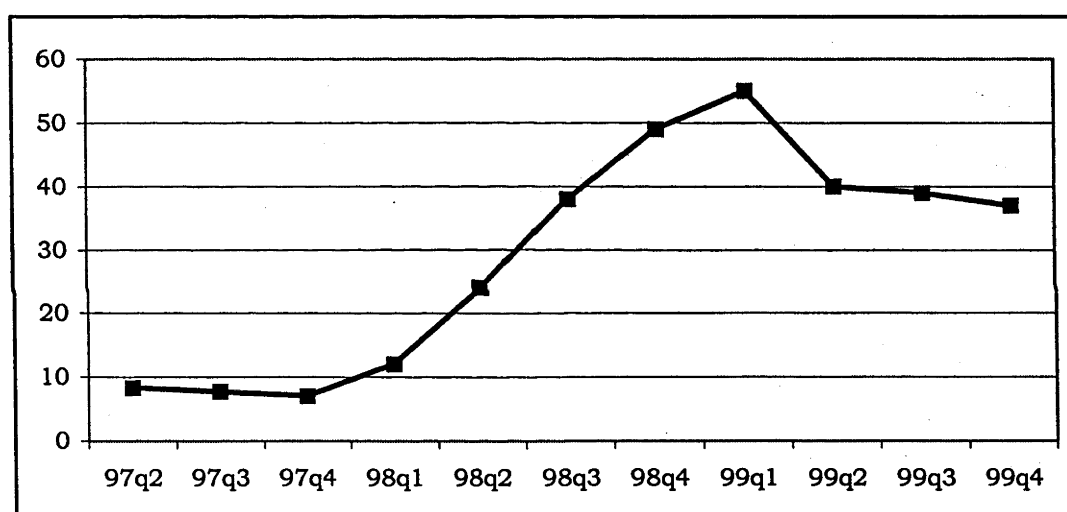
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<sup>9</sup> The IMF sponsored program consist of a \$43 billion financial support from the Fund (\$10 billion), the World Bank (\$4.5 billion), IDB (\$3.5 billion), Japan (\$5 billion), Singapore (\$5 billion), the US (\$3 billion), Malaysia (\$1 billion), Australia (\$1 billion), Brunei (\$1.2 billion), Indonesia itself (\$5 billion), and the rest was from China and Hong Kong SAR. See Soesatro and Basri (1998) for a detailed discussion on the program.

paralysed by minus 16 per cent growth. But, in the year 2000, it grew faster than GDP. This suggests that growth in the real sector is crucial for a banking recovery. But the converse is also true: the health of the sector will be a key factor for assuring sustainable recovery of real activities. This will be further elaborated on in the next section.

The problem is that the banking sector had to cope with increased non-performing loans (Figure 10.10). NPLs increased sharply in 1998, and peaked in the first quarter of 1999, at about six times that of the pre-crisis level. In the following quarters, it dropped to around 40 per cent. However, the drop was a result of the fact that bad loans were transferred to IBRA. Thus the actual figure is, in fact, higher.

**Figure 10.10.** *Non-performing loans, 1997-99 (% of total loans)*



Source: BI

With mounting NPLs, banks had to shoulder steep financial losses and their cash flow was severely disrupted. In a crisis situation, it was difficult to seek fresh capital for covering these losses. As a result, from January 1997, bank equity capital declined sharply (Figure 10.11). The ratio of bank capital to total assets recorded its lowest level in February and March 1999, when the ratio was about minus 40 per cent. After that the ratio improved markedly, but was still negative. However, this improvement was not due to injection of new

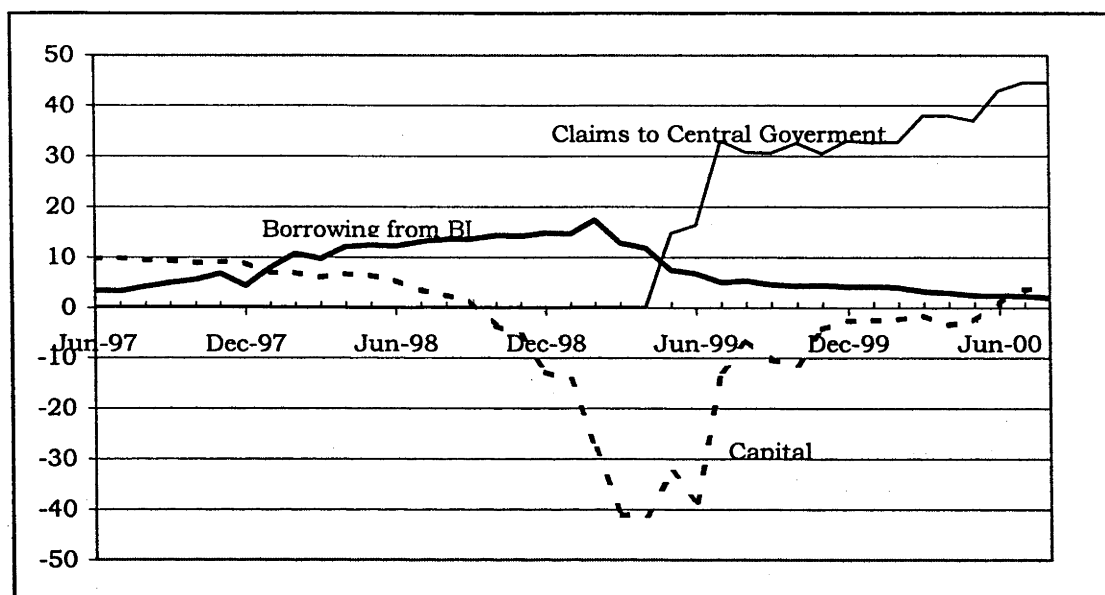
capital by the owners or new investors. Bad loans were transferred to IBRA and replaced by illiquid government bonds (see Figure 10.11 on claims on central government). The movement on claims on the central government mirrors the improvement in banks' capital position. Therefore, the financial position of banks looks better than it actually is.

As discussed in Chapters 3 and 5, most major private banks were owned by conglomerates and committed to self-lending. The same conglomerates were also heavily exposed to foreign borrowing, and also hit severely by the crisis. Because of that, they did not have sufficient financial resources to fully recapitalised their banks. Likewise, the central government was also budget constrained and could not inject fresh capital in to both the ailing state and private banks. All state banks were insolvent and most affected by the crisis relative to other banks.

Recapitalising banks with government bonds has two important consequences. First, bad loans taken out from private and state banks will not be fully recovered. The value of such assets is usually much lower than the book value. Moreover, selling assets in a crisis situation is difficult, unless the government is ready to accept a very low price. However, waiting for a better economic situation can be even more costly. Under a weak and corrupt institutional setting, assets are prone to looting and 'collusive' pricing. The government is already well known for its inability to safeguard its assets. The fact that almost every year the state banks need injections from the government represents poor institutional capacity to maintain public assets.

Second, aside from the above-mentioned potential loss, the interest on the bonds will put massive pressure on the budget. For instance, in 2000 the interest payment will be about Rp 38 trillion, or about 4 % of GDP. In year 2001, it is estimated to be around Rp 56 trillion, or about 19 per cent of the total (planned) government budget.

**Figure 10.11.** *Deterioration of banks' financial position, 1997-2000*  
(% of total assets)



Source: BI, *Indonesian Financial Statistics*.

By the end of 1999, it is estimated that the government bonds needed to bail out and recapitalise domestic banks is around Rp 621 trillion, or about 51 per cent of GDP in fiscal year 1999/2000 (Fane 2000).<sup>10</sup> Note that this figure does not include interest payment on the bonds. A year ago, the estimate was only Rp 166 trillion, which suggests the banking sector deteriorated rapidly (Cameron 1999).

With bad loans taken care of by the government, the effective commercial loans issued by banks declined sharply (Figure 10.12). The pre-crisis level of loans to GDP ratio was around 53 per cent and, until mid 1998, it continued to increase, with the trend similar to the pre-crisis one. After that, the ratio began

<sup>10</sup> The latest estimate for the figure is Rp 654 trillion (*Detikcom*, 5 October 2000). See Fane (2000) Table 9, for detailed estimates for 1999.

to decline and, by September 1998, it was already lower than the pre-crisis level. By March 1999, the ratio was just about 41 per cent. This suggests that loan contraction was bigger than output compression. The sharp fall to 24 per cent that occurred in mid 1999 was due to the fact that bad loans were taken over by IBRA. By mid 2000, the ratio was just about 19 per cent, which is similar to that in the early 1980s.

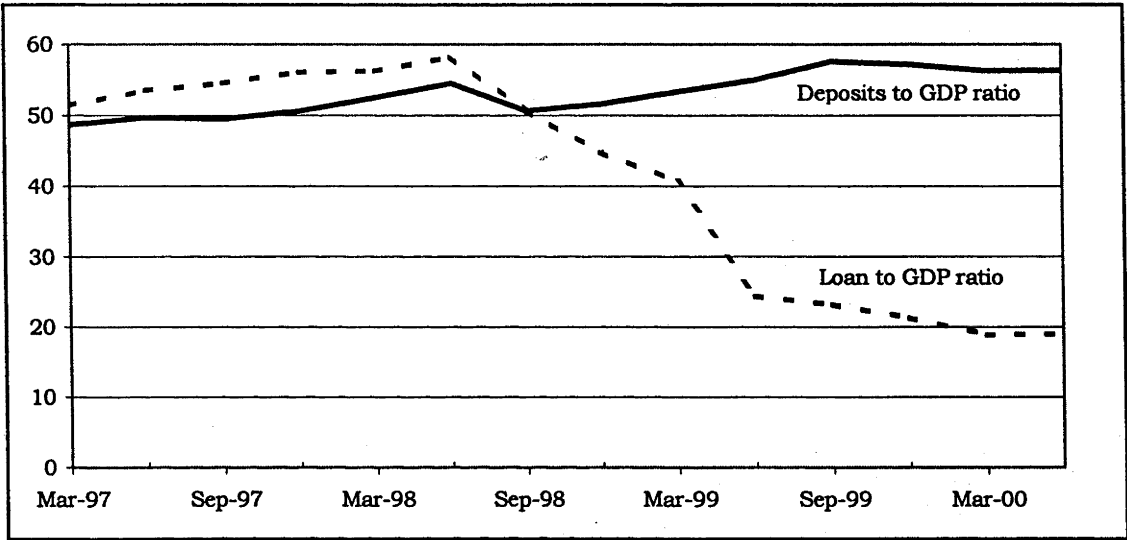
Figure 10.12 suggests that banks have been incapacitated by NPLs. The pre-crisis tendency was that loans and deposits tended to move closely together, and this was maintained until mid 1998. Because banks made losses and owners did not inject new capital, loanable funds were used to service deposits. Note that household consumption did not fall as sharply as output, suggesting that households utilised their savings to smooth consumption when income was falling. With high interest rates, there was a windfall for depositors, enabling them to sustain consumption.

By mid 2000, the gap between deposits and loans was about 37 per cent of GDP. This gap measures implosion in the loan market and the banks' burden to service liabilities. With almost half of total bank assets held by IBRA, interest earnings from government bonds became the major source of bank income.<sup>11</sup> Banks are allowed to sell off some of the bonds so that the proceeds can be utilised to issue new loans. However, the market was not so responsive, partly owing to the low interest rates offered. The market demanded a heavy discount, but this means banks' assets and capital would be reduced significantly. The bonds are practically illiquid.

In order to make investment bonds attractive, the government can increase the interest rate. However, the government is budget constrained, owing to the slow progress made by IBRA in selling off the assets. For the fiscal year 2000, IBRA's target is to dispose of around Rp 18.9 trillion of assets, but by September only Rp 7.7 trillion had been raised. The remaining Rp 11.2 trillion was to be met by divesting shares in Bank Central Asia, Bank Niaga, Bank Internasional Indonesia, Bank Universal, and several other big

companies. However, the sale of the first two banks was postponed until 2001, due to the weak responses from the market. Note that, even if IBRA can meet the target, the target itself is far lower than the total value of the bonds plus the interest. Because of that, the government will be very cautious in raising the interest rate.

**Figure 10.12.** *Financial Disintermediation, 1997-2000 (% of nominal GDP)*



Source: Indonesian Financial Statistics, BI

Because the bonds are illiquid and IBRA's progress in disposing of the assets is very slow, the loan to GDP ratio is unlikely to improve much in the near future. The low level of effective loans will certainly affect the speed of economic recovery. Unless firms regain the credibility of foreign creditors, they are likely to be credit constrained in expanding production capacity, or utilising the existing capacity. Relatively healthy firms may have to rely on self-financing from retained earnings. The problem is that banks lose the allocative efficiency of shifting funds around productive investment. Banks cannot effectively utilise funds trapped in NPLs.

<sup>11</sup> See Figure 10.11 about claims on central government, which measures banks' assets acquired by IBRA.

## **10.5. Transmission Mechanisms**

So far, the discussion in the last few sections has been generally descriptive, yet three issues remain to be addressed more rigorously. First, it is still not completely clear whether the interest rate rise or devaluation contributed most to the contraction of economic activities. It was highlighted in section 9.6 that an interest hike could be more costly than devaluation to the banking sector. However it is also important to assess the effect of the two shocks on the real sector.

Second, a devaluation generally stimulates exports. The elastic estimates reported in Chapter 8 suggests that a one per cent real depreciation brings about 1.33 per cent increase in non-oil exports. However, as discussed in 10.4.2, there was export compression from 1998. Therefore, there is a need to look for possible sources of disruption in exports, such as the dry up of trade credits owing to the banking sector collapse.

Third, there is a need to assess the role of bank restructuring in sustaining and accelerating economic recovery. It was argued in the previous section that revitalization of the credit market would be critical for the recovery. The purpose in this section is to test this view.

All these issues will be analysed by using impulse response functions (IRFs). The simulation procedure to obtain the IRFs was set out in section 7.4, which is a full model solution for the impacts of a particular shock. By using this technique, the effect of any unexpected shock to the system can be traced through deviations of the shocked time paths from the 'expected time path' given by the model.

It should be stressed from the outset that IRFs measure deviations from the original trend. For instance, a shock in the real exchange rate may cause consumption to decline by 1 percent from its time path, and not from actual consumption. If current consumption is 100 and expected consumption in the next quarter is 105, the fall is not from 100 but from 105. In other words,

consumption in the next quarter still increases, but by less than it would have without the shock.

However, the procedure applied here has one "default limitation". Since the cointegrating relationships are imposed in the model, the effect of a shock is treated to be permanent.<sup>12</sup> Consequently, the results should be interpreted cautiously, as they cannot make a distinction between transitional and permanent effects.

In order to reduce the risk of overstating the effects of a shock, the results will be interpreted somewhat qualitatively. More specifically, the focus will be on the directions of the effects (increase or decrease), and on the relative magnitude (larger or smaller relative to others), but not on the exact magnitude. The purpose here is not to replicate the actual crisis, but to draw some important inferences in a qualitative manner.

### **10.5.1. Impacts of devaluation**

As indicated by the MPI, Indonesia experienced unexpected shocks on the foreign exchange market throughout the crisis period. The purpose of the following simulation is to analyse the impacts of a real depreciation on consumption, investment, output, exports and imports. The shock given to the system is a one standard deviation of the real exchange rate, or about a 3.7 per cent depreciation. The IRFs are presented in Figure 10.13.

In terms of directions, they suggest that a real devaluation will cause declines in consumption, investment, output, and imports, and an increase in exports. There is a need to compare these results with the actual situation discussed in section 10.4, in order to analyse the role of devaluation in the decline of real economic activity.

Among the components of domestic absorption, the impact on investment is more pronounced than on consumption. Therefore, it is not

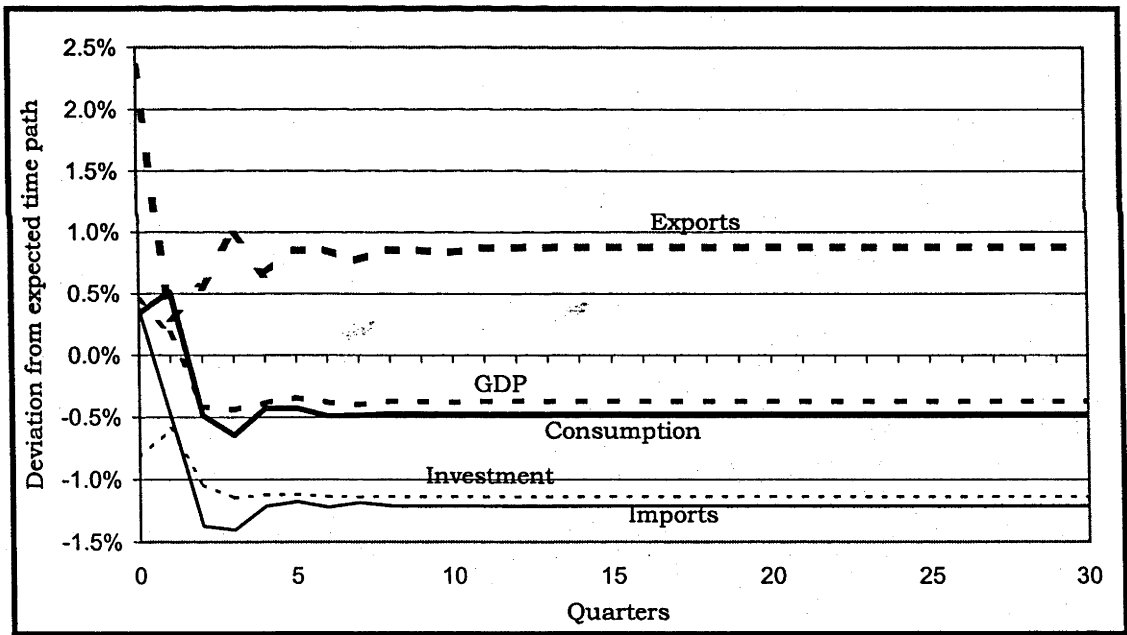
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<sup>12</sup> See Park (1991) and Park and Ogaki (1990) for this issue.



surprising that the decline in investment during the crisis was far bigger (Table 10.2). In other words, there is statistical evidence that devaluation tends to reduce domestic absorption, which is especially transmitted through the collapse in investment spending. Because of that, the supply side of the economy would be the most affected. This may also explain why NPLs increased. The burden of foreign exchange denominated debts increased, leading to firms' insolvency. This also suggests that a revival in investment spending will be vital for accelerating and sustaining economic recovery. However, as discussed, the recovery has so far been consumption driven. Because the banking sector is still paralysed, domestic investment is likely to be credit constrained. It follows that successful bank restructuring is a must for durable, long-term recovery.

**Figure 10.13.** *Impulse Response Functions to a One Standard Deviation Shock on Real Depreciation*



As seen in Figure 10.13, output tends to decline persistently, which suggests that the offset effect of export expansion is lower than contraction in consumption and investment. Whether devaluation is contractionary in the

long run is still debated.<sup>13</sup> However, it is safe to say it is contractionary in the short run. In addition, the fall in output is also lower than that in consumption, which is not consistent with the stylised fact discussed in section 10.4.2. However, it will be argued shortly that the larger actual fall in GDP was caused by an exports implosion.

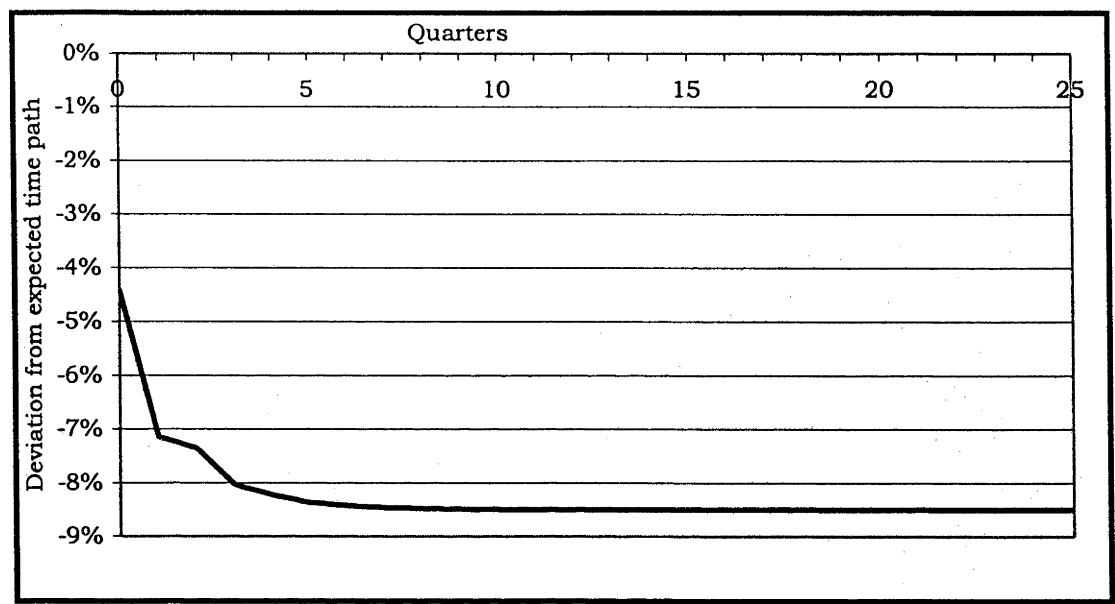
IRF predicts an export expansion, while the actual data suggest a contraction. Note that exports are actually non-oil exports, but will just be called exports. The model is consistent with the theoretical literature that devaluation can generate exports, which are in turn important in offsetting the decline in domestic absorption. Thus, there should be some circumstantial factors other than the devaluation that caused exports to weaken. Such factors include the drying up of trade credit, owing to the collapse of the banking sector, and supply disruptions caused by looting, social violence and political turbulence. In the model, the effect of the collapse of the banking sector and supply disruptions can be captured by a negative shock on the export capacity index. The breakdown in the domestic loan market might affect the availability of trade financing for exporters from domestic banks. It might also have been difficult to find new creditors (e.g., foreign banks), because of the high uncertainty during the crisis. In effect, because of credit constraints, the capacity to export declined. In other words, the effect of a loan implosion will be the same as that for a supply disruption.

Figure 10.14 displays the effect of a negative one standard deviation shock of capacity index on exports. It shows a decline in exports, and therefore there is statistical evidence that the collapse of the banking sector and supply disruptions had reduced exports. It follows that the severe output contraction in 1998 may have been due in part to the disruption of export oriented firms.

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<sup>13</sup> Edwards (1986) maintains that devaluation has small contractionary effect in the short run, but is neutral in the long run. However, Sheehey (1986) claims that it can be contractionary in both cases.

**Figure 10.14.** *Impulse Response Function of Exports to a Negative One Standard Deviation Shock on Capacity Index.*



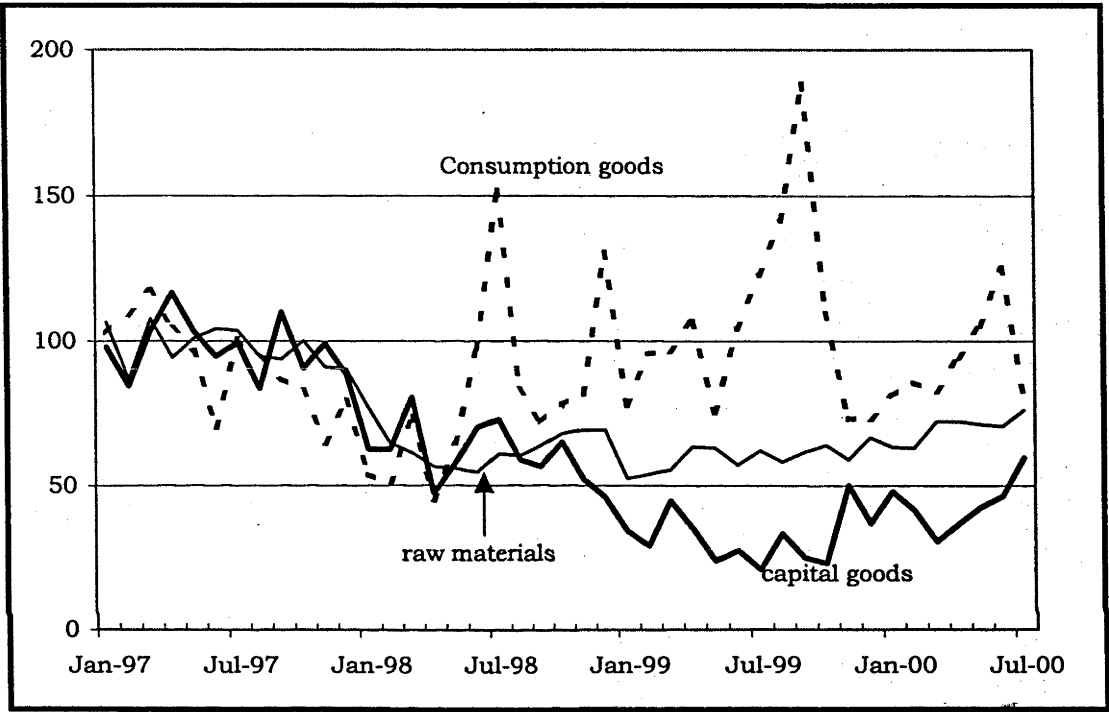
If this finding is correct, it shows that the collapse of the banking sector had propagated the crisis. This supports the view asserted by Hill (2000) that the poor export performance was the result in part of a paralysed domestic credit market. Since the revival of exports will offset the large contraction in investment, bank restructuring is a key to the recovery.

As seen in Figure 10.13, the worst impact of the devaluation was on imports. With exports under performing, improvement in the trade balance mainly came from an imports implosion.

Because the import reduction coincided with the fall in investment, it can be inferred that the decrease in investment related imports was bigger than that in consumption related ones. As seen in Figure 10.15, it is clear that a sharp and more persistent decline occurred in the imports of capital goods and raw materials. By mid 2000, imports of capital goods were only about 20 per cent of their pre-crisis level. To a lesser extent, the imports of raw materials were about 42 per cent lower than the pre-crisis level. Imports of consumption goods decreased from mid 1997 to March 1998, before increasing again with some

erratic fluctuation. This suggests that firms were affected the most by devaluation and economic contraction, and the adjustment took the form of a severe reduction in capital goods spending. The reduction in imported raw materials may be partly attributed to the decline in exports.

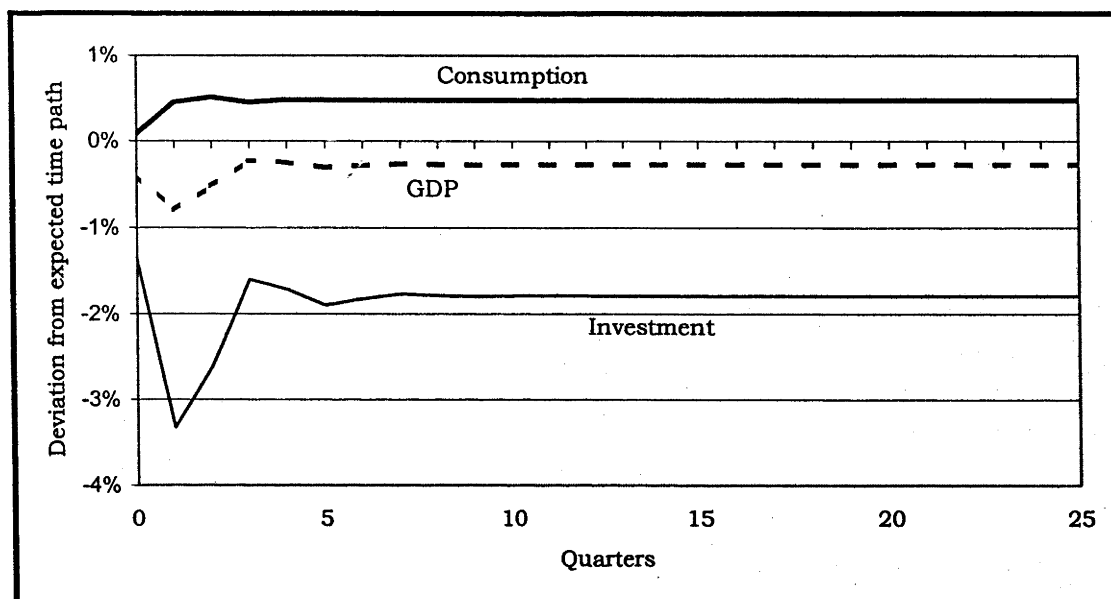
**Figure 10.15.** *Trends in Major Import Items, 1997-2000*  
(January-June 1997=100, in nominal terms)



### 10.5.2. Impacts of interest rate hikes

The other source of economic contraction is an interest rate rise. As discussed, interest rates were increased twice: in August 1997 and in March 1998. The former was meant to deter the speculative attack, while the latter was to stabilise the money supply. In the following simulation, a (positive) one standard deviation shock on the SBI rate is given to the model. Note that the SBI rate is a policy instrument to affect the other market rates. The IRFs are presented in Figure 10.16.

**Figure 10.16.** *Impulse Response Functions of a One Standard Deviation Shock on the SBI rate*



As seen in Figure 10.16, investment is worst affected by an interest hike, suggesting that the economy adjusts mainly through investment compression. An increase in interest rate raises the cost of external financing, thereby reducing the incentive to invest.

It is interesting to compare the impacts of a devaluation and interest rate rise on investment.<sup>14</sup> Note that a one standard deviation shock on devaluation is about 3.7 per cent, while that on the interest rate is 2.7 per cent. To make a comparison, the effects of an interest rate hike need to be multiplied by 3.7 and then divided by 2.7. By doing this, it is clear that the contractionary effect of an interest rate hike is larger than that of a devaluation.<sup>15</sup> This may be due to the fact that interest rates increases have wider ramification on the economy

<sup>14</sup> The comparison is better facilitated by a Monte Carlo simulation, by which standard errors of each IRF can be obtained. Hence statistical tests can be inferred precisely. However, due to time limitation, such simulation was not carried out.

<sup>15</sup> However, such comparison is only plausible in the case that depreciation is triggered by expected depreciation and that the interest rate rise can offset such expectation without further complicates the banking sector. The comparison does not apply for the case of heightened-risk perception that lead to a currency collapse.

operating through financial intermediaries, while a devaluation mainly affects firms with currency mismatch.

The impact of the interest rate on output is also contractionary, but less pronounced than that on investment. Compared to the effect of a devaluation, the effect of the interest rate hike is deeper in the first three quarters. Thereafter, the effects are almost equal. Therefore, for the short run, an interest rate hike is more costly. However, this does not hold for the longer term.

The effect on consumption is quite unexpected. The IRF shows that an interest rate rise tends to increase consumption both in the short and long run. It is possible to argue that a windfall from the interest on deposits and bonds can stimulate consumption in the short run. However, a continuous increase in consumption needs to be supported by an increase in income and output. This is not consistent with the fact that the IRF shows a persistent fall in output in the long run. Therefore, the results should be interpreted for the short run impacts.

The fact that a higher interest rate can lead to lower investment and output has important implications for economic recovery. A relatively low interest rate will be favourable for economic growth, as this can give relief to distressed firms. However, in an open capital account regime, this may induce capital outflows, making it difficult to stabilise the exchange rate. Therefore, some form of capital outflow control may be needed to stimulate recovery.

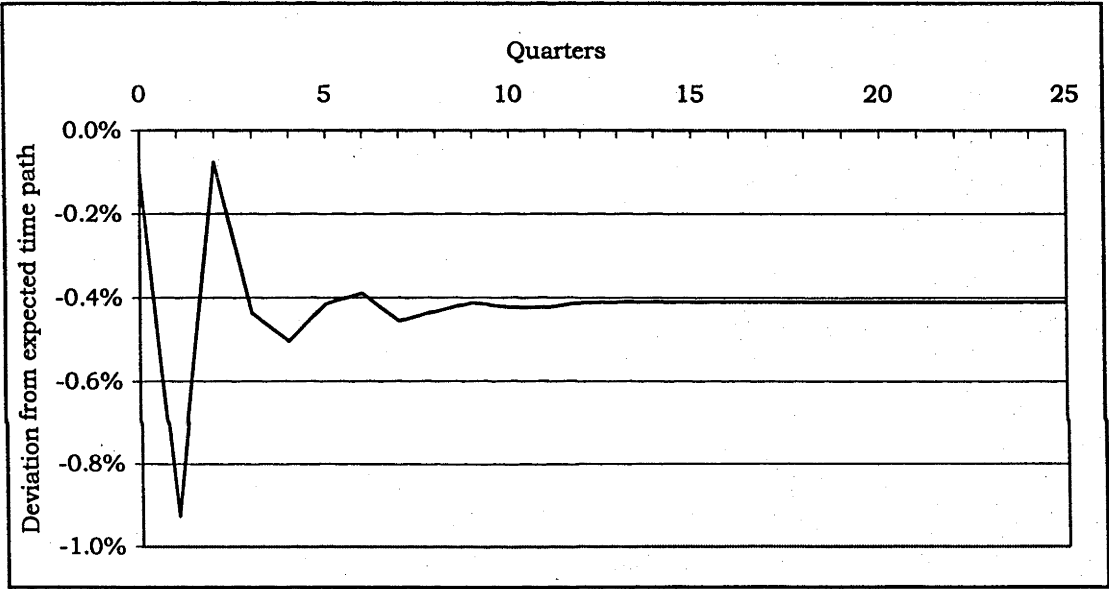
### ***10.5.3. Feedback effect from the banking sector***

It is important to analyse the impact of a paralysed banking sector on real economic activity. Because of high NPLs, banks are constrained in shifting funds from less productive activities to more productive ones. Therefore, even healthier firms can become credit constrained. In order to assess this possibility, a shock on loan supply will be given to the system. NPL means

some fraction of the loans become unproductive and hence the effect of an increase in NPLs would be similar to a decline in loan supply.

A one standard deviation shock on bank loans is equal to 3.6 per cent change in loan supply. Therefore, when a negative shock is given, it is assumed that bank loans decrease by that amount. The exact corresponding amount of NPLs is not specified, as it is difficult to have sufficient time series data on NPLs. Figure 10.17 presents the effect on output of an increase in NPLs.

**Figure 10.17.** *Impulse Response Function of  
Negative One Standard Deviation Shock on Bank Loan.*



In general, it can be said that an increase in NPLs causes a decline in output. In other words, the weakening in banks' balance sheets can induce further deterioration in real sector. Thus, a weak banking system tends to propagate the crisis.

This finding also suggests that recovering assets trapped in NPLs can revive banks' capacity to extend loans. As discussed, IBRA made slow progress in restructuring and selling assets. Because of this, firms were still credit constrained, and it is not surprising that Indonesia's recovery lagged behind the other crisis countries in the region

## **10.6. Concluding remarks**

The analysis in this chapter has several key findings. First, there is evidence that domestic agents may have anticipated the incoming banking problem after the outbreak of the Asian crisis. This is indicated by the decline in the share of deposits held in private banks and the increase in the share of state banks (i.e. a flight to safety) that occurred after July 1997. The closure of 16 banks in November 1997 validated their anticipation, and subsequently, there were large deposit withdrawals from suspect private banks. The political and social uncertainty that occurred, especially during May 1998, all helped to heighten these adverse perception.

Second, blanket guarantees and liquidity support were not credible, partly owing to the fact that they were not backed with strict controls on capital outflows and sufficient foreign exchange reserves. As a result, bank runs were followed by capital flight. The exodus of cash-rich ethnic Chinese further aggravated the problems.

Third, increases in the interest rate were not effective in stabilising the money supply. The results in section 9.6 show that an interest rate hike tended to complicate the banking sector, provoking further liquidity infusion from the authorities. Banks were paralysed by the negative spread and increase in NPLs. Because of the fragile banking system, Indonesia could not afford to have such a hike.

Fourth, the impact of devaluation on output, investment, consumption, and imports tended to be contractionary, while that on exports tended to be expansionary. However, the expansionary effect could not be fully utilised because of disruptions in export supply largely due to the collapse of the banking system.<sup>16</sup> Moreover, the revival of exports was also hampered by the fact that the real exchange rate was close to that of the other crisis countries. Because of inflationary pressures, the large real depreciation quickly

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<sup>16</sup> As highlighted, other factors are also important. However, the focus here is on the banking sector.



disappeared. Therefore, the improvement in the trade balance mainly came from an import implosion, rather than an export expansion.

Fifth, an interest rate rise was contractionary on output and investment. The impacts of an interest rate hike tended to be more severe than that of the devaluation, especially in the short run. This is because the impact of such a rise was more broad-based, in that all firms were affected, and because it affected the banks more adversely.

Sixth, the increased banking fragility tended to propagate the crisis. Increases in NPLs reduced the effective supply of bank loans, which constrained the expansion of healthy firms. In effect, the collapse of the credit market added recessionary pressures and hampered recovery,

# **Chapter 11**

## ***Conclusion and Policy Implications***

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This thesis has examined the role of the banking sector in the origin and propagation of the recent financial crisis in Indonesia. This chapter summarises the main findings and their policy implications.

### **11.1. Main Findings**

This section summarises the main findings of this study. Throughout Chapters 3 to 10, it has been shown that the banking sector played an important role in making the economy vulnerable to the financial crisis and in transforming it into a full-blown economic collapse. At the onset of the crisis, two conditions for the crisis were satisfied: (1) the balance of payments was susceptible to a sudden reversal of capital inflows, and (2) a weak banking system made it difficult to use interest rate policy to deter speculative attacks. When the crisis set in, the vicious cycle was inevitable. It further damaged the already ailing banking system, causing panic, loss of monetary control, capital outflows and exchange rate overshooting. The subsequent collapse of the loan market prevented exporters from fully benefiting from the real exchange rate depreciation, leading to a massive contraction in output. In the course of a few months, Indonesia went from 'being a miracle to a needing one', and 'from hope to despair'.

Despite high economic growth in the lead up to the crisis, the financial system was precarious and vulnerable to an adverse shock. Deregulation in 1983 and 1988 transformed the banking sector from the previous state banks dominated system towards a greater role for private banks. Deposits and loans grew rapidly, and competition heightened. However, this positive development was not accompanied by an overall improvement in bank soundness. While the state banks remained weak, the large private banks developed problems similar

to those of state banks. Fragile private banks were characterised by rampant connected lending, lower capital and liquidity, and higher loan growth, foreign liabilities and placement with other banks. Some of them were owned by the cronies.

*Connected lending* was especially prevalent amongst large conglomerate-owned banks. Almost 80 per cent of insolvent banks included in the estimation possessed this problem with the average of loans allocated to affiliated firms at about 104 per cent of equity capital. This means the owners effectively did not contribute capital at all, as any capital injected was drawn back as loans. This rampant self-dealing tactic created low quality and risky banks' portfolio. The reasons are, first, with low effective capital there was incentive for owners to engage in risky projects, which may have been lucrative before the crisis but were prone to any downturn in economic activity. Second, risks were often not correctly priced, i.e. affiliates were given concessionary loans. Third, it resulted in a heavy concentration of loans, which reduced the scope of bank assets portfolios.

There was a strong association between *high loan growth* and bank fragility. New opportunities to open branches led the larger banks to expand their network and deposit base. They had credibility advantages compared with small new-established banks. Moreover, they offered a more convenient means for depositors compared to the ill-managed state banks. This expansion was done almost without regards for cost and risk. The increase in deposits was not accompanied by prudent lending, which was mainly due to lack of expertise in loan assessment and the greed to expand their own business conglomerations.

*Capital adequacy requirement* was amongst the most frequently violated prudential measures. At the onset of the crisis, about 50 banks could not meet a 5 per cent CAR, and 6 of them were technically insolvent. A higher CAR could have induced a disincentive for owners to risk the banks, as a larger proportion of asset portfolios were financed by equity capital. The fact that banks with a lower CAR were amongst the fragile ones indicates they might have been poorly managed. A lower capital ratio also suggests the owners' low willingness

and/or ability to further increase capital to the required level. Therefore, the banks were less able to cushion the adverse consequences of the crisis.

Banking fragility was also characterised by lower *liquidity*. Banks with low liquid assets relative to liabilities were less able to lessen the adverse effects of bank runs. Because their cash flow was interrupted, they had to rely on the inter-bank market and liquidity support from BI, meaning that they had to pay a higher interest rate. In order to reduce further losses, it was necessary to liquidate assets. Thus, liquid assets provided a cushion against panic runs.

*Placements* with other banks increased fragility partly because the government was slow to honour the guarantee of banks' third party liabilities. Lending to other banks exposed the lenders to a systemic risk, i.e. one bank fails because other banks become bankrupt. IBRA made slow progress in disposing of its assets, so that these inter-bank claims could not quickly serviced. So it is plausible to argue that the guarantee did not effectively reduce the systemic risk.

There was also a problem with higher *foreign liabilities* amongst insolvent banks, although it was firms that possessed currency mismatch, and not the banks. This suggests that currency depreciation indirectly affected the banks through deterioration in the quality of loans that were denominated in foreign currency.

It is not surprising that the banks owned by *cronies* were amongst the weakest. As in other sectors, they were given implicit protection and privileges, which induced a moral hazard problem. Even if they had violated serious prudential regulations, the authorities did not penalise or close these banks.

All of this suggests the main problem was the weak enforcement of prudential regulations. Although the authorities had developed relatively stricter regulatory means, they were hampered by political interference and a weak legal system.

The problems were compounded by competitive pressures, which lessened profit margins and risk provision. The increased number of banks and

branches heightened this competition. Private banks became chronic borrowers from BI. From 1995, BI's claims on domestic banks increased rapidly, at a rate far higher than that in the early 80s. These claims were the second largest component of base money, after foreign exchange reserves. By June 1997, the private banks' share in borrowing from the central bank was about 47 per cent, compared with only 10 per cent in 1985.

The state banks continued to depend on capital and liquidity infusions from the authority. Political interference in loan allocation remained strong, leading to heavy loan concentration on a small number of conglomerates. In addition, competitive pressures caused these banks to lose significant market share.

In sum, during the 1990s, banks continued to accumulate serious problems, which were buried by the reluctance of the authorities to be tough on banks breaking prudential regulations and, most importantly, by the optimism created by rapid economic growth. Thus in the lead-up to the crisis, both the private and state banks were fragile.

The crisis was preceded by a boom in private capital inflows, which led to almost a decade of an uninterrupted balance of payments surplus. These inflows were used to finance persistent but 'manageable' current account deficits (CADs). Before the mid 1980s, CADs mirrored official capital inflows, which were generated by the need to finance budget deficits. In the 90s, as official flows lessened, private agents contributed the most in cross-border capital movement. Moreover, 'short-term' private inflows began to dominate the capital account. However, Indonesia's budget principle continued to be dominated by the 'Lawson Doctrine', that private sector led CAD is not a problem.

The offshore borrowing spree enjoyed by domestic private corporations also changed the structure of foreign debts. By the end of 1996, total foreign debt was about \$129 billion, compared to only \$25 billion in 1982. The share of private foreign debts increased, from about 17 percent in 1982 to about 53

percent in 1996. The share of short-term debts increased from only about 14 percent to 25 percent in the same period.

In the run up to the crisis, the balance of payments was susceptible to a reversal of capital inflows. Three problems stand out. The first was a high ratio of debt service to total exports. Compared with the other four Asian crisis countries, Indonesia had the highest ratio, and was actually close to Argentina's in the early 1980s. Second, foreign exchange reserves were insufficient to cover liquid foreign liabilities. Again, in this case, Indonesia together with South Korea was the most vulnerable. These two indicators may not be relevant in a period of booming capital influx. However, when capital flows reverse, balance of payments deficits have to be met by an improvement in the trade balance (i.e. import implosion and export expansion) and/or by running down reserves. Third, there was a currency mismatch problem on the part of Indonesia's corporations. A large fraction of private foreign debt was not hedged, partly due to a long record of exchange rate stability. The problem was particularly pronounced in domestic oriented non-tradable industry such as property and land transport.

It all began in Bangkok on 2 July 1997. As indicated by MPI, foreign exchange market pressure in August 1997 was exceptionally high, about 27 times that of pre-crisis period. The authorities wasted around \$1 billion in forward transactions. On August 14, the government finally abandoned the peg and let the market determine the value of the currency.

Moreover, to accompany the float and to avoid exchange rate overshooting, the authorities announced their intention to tighten monetary conditions by increasing interest rates and reducing the central bank's purchase of SBPUs. This tight money policy did not stabilise the currency, and actually provoked further attacks.

The problem was that the banking sector was fragile. By increasing interest rates, banks' balance sheets weakened, complicating the problems. As a result, by the end of August, liquidity support extended to domestic banks increased by 34 per cent from the previous month. In the following 3 months,

this support continued to increase at an alarming rate, suggesting the weakening of banks' financial position.

This is confirmed by the IRFs, which suggest that the interest rate rise tended to increase the cost of bank bailout. Moreover, the IRFs also show that such a rise could not prevent the currency from falling. In other words, interest rate policy was not credible in deterring speculative attacks.

The propagation of the crisis began after the liquidation of 16 banks on 1 November 1997. Despite some procedural faults in the liquidation process that may have induced panic runs, domestic agents may have anticipated the incoming banking problem after the outbreak of the Asian crisis. From August, the share of deposits held in private banks decreased. This is an indication that there was doubt about the safety of deposits. The November bank closures validated their doubts, and subsequently, there were large deposit withdrawals from suspect private banks. The political and social uncertainty that occurred, especially during May 1998, also helped to magnify these adverse perceptions.

In order to calm down bank depositors and lenders, a blanket guarantee was introduced at the end of January 1998. However, the guarantee was not credible, and the runs on private banks continued on a larger scale. The problem was that the guarantee was not backed with strict controls on capital outflows and sufficient foreign exchange reserves. Thus it did not cover foreign exchange risks. Moreover, the panic was aggravated by the political crisis and social violence. Massive withdrawals of deposits occurred, especially amongst wealthy ethnic Chinese anxious to escape the country. Consequently, bank runs were followed by money expansion, capital outflows and exchange rate overshooting.

In order to stabilise the money supply, a high interest rate policy was again introduced in late February 1998. As a result, the banks were paralysed by the negative spread and the increase in NPLs. Because the banks made losses, the need to bail them out increased. Consequently, the interest rate policy failed to reduce the money supply.

Moreover, interest rate increases produced a recessionary effect on output and investment, and the effect on investment was even more pronounced. In other words, the adverse effects were mainly channelled through investment spending. It can be concluded that the interest rate hike induced a downfall in economic activities and increased banking fragility.

Massive rupiah depreciation also generated a contractionary impact on output, investment, consumption, and imports, but the impact on exports tended to be expansionary. The effect on imports was the largest, followed by investment and consumption. This suggests the economy adjusted through expenditure switching. However, the expansionary effect could not be fully utilised, because of disruptions in export supply partly due to the collapse of the banking sector. Therefore, the improvement in the trade balance mainly came from an import compression, rather than from an export expansion.

The high interest rates, depreciation and economic recession increased banking sector fragility. Increases in NPLs reduced the effective supply of bank loans, and the credit market collapse further worsened economic activities. Therefore, the increased banking fragility propagated the crisis.

It can be concluded that high interest rates and depreciation had destabilising effects on aggregate real economic activities. These effects were aggravated by the breakdown of the banking system.

## ***11.2. Policy implications***

Until June 2000 real investment had yet not revived, and the positive growth in output has so far been driven by consumption. Because investment was the worst affected, its revitalisation will stimulate economic recovery. Moreover, the competitive advantage generated by real depreciation needs to be utilised before it disappears. Exports have performed poorly. The revival in exports and investment was hampered by the breakdown of the credit market. Thus bank restructuring is critical for stimulating and sustaining the recovery.



In the short run, the authorities should concentrate on policies that can revive the credit market. The objective of such policies should be to close the deposit-loan gap, which is about 37 per cent of GDP. This can be done through recovering and selling bank assets trapped in bad loans. The proceeds can then be injected back into the banking system, hence increasing loanable funds.

However, IBRA seems unable to accelerate the recovery of the assets. Some assets sales have been postponed. Moreover, IBRA seems to suffer from a lack of cohesive planning and a sense of urgency. Its immediate target is very limited to service some fraction of the interest payments on government bonds. Because of this, the loan market is unlikely to recover quickly in the near future, thereby holding back economic recovery.

In the long run, the policy emphasis should be on preventing the crisis from recurring. This requires, *inter alia*, sound and prudent banking practices. As discussed, the main problem was not due to a lack of strict prudential regulations. It was the weak enforcement of such regulations that created the problems. As of now, it is not clear whether the institutional capacity of the authorities will improve significantly in the near future.

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